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Advanced Perspectives on Global Industry Transitions and Business Opportunities

Fanny Saruchera

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Advanced Perspectives on Global Industry Transitions and Business Opportunities

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Detailed Table of Contents

New types of companies have emerged, known as "Born Globals" (BGs), transitioning and internationalizing early and rapidly. They have attracted scholarly interest because their involvement in international sales from the moment of inception contradicts the more traditional perspectives on internationalization. This chapter explores a gap in the literature on BG micro-enterprises' behavior on their internationalization trajectory. It analyzes the case of a micro-company based in Aveiro, Portugal that follows a passive internationalization path to embrace a BG's typical behavior. The behavior of this micro-company is examined to illustrate how a BG can find new opportunities abroad and take advantage of them, the main entry modes and marketing strategies adopted in the early and rapid internationalization process, the importance of networking and growth strategies, and the role of the CEO in the internationalization process. This chapter adds value by explaining how a micro-enterprise manages to overcome its passive behavior and evolve into a BG company.

This chapter investigates key motivations, drivers, and barriers for firms that are seeking to enter new international supply chains for renewable energy. Offshore wind (OW) is a born global industry with a fully internationalized supply chain from inception. The study adopts a mixed-methods approach by first doing 11 case studies of Norwegian industrial companies entering OW and secondly by conducting an online survey targeting the whole population of Norwegian firms in OW. The study finds that new green industries' distinctive features, managerial motivation, and industry relatedness shape a firm's entry strategies and behavior. Risk and uncertainty, complexity and turbulence, high transaction costs and disadvantages of scale postpone industry entry from established actors. The study finds that environmental motivation tops the list of motivations for managers to enter, but financial motivation is the strongest of perceived market performance. Finally, the study finds that market relatedness is more critical than technological relatedness.

The aggregate production planning model aims to match the supply with demand while minimizing the manufacturing or production activity costs. There are many methods in the mathematical programming theory to solve the aggregate production planning problem. This chapter develops a novel decision support system for the aggregate production planning model using the linear programming approach. The aggregate production problem modeled by the linear programming has been coded in R computer programming language, and a novel web application has been developed using Shiny to serve the needs of the production managers. The novel application is adjustable for any production setting and planning horizon for firms in global transitioning.

The rapid developments in information, communication, and transportation have led to an increase in competition between enterprises. As a result, entrepreneurs striving to survive in the global competition have begun to invest in "digital" competition, which differs from traditional entrepreneurship as it does not require large amounts of capital for its establishment. It enables entrepreneurship to operate all around the world with the internet. This chapter focuses on the differences between digital and traditional enterprises, emphasizing the importance of digital enterprises. According to this purpose, the study employed SWOT analysis to identify Turkish digital enterprises' strengths and weaknesses in relation to the corresponding opportunities and threats.

In recent times, foreign portfolio investment inflows have been considered pivotal to sub-Saharan Africa's growth (SSA) as they help enhance liquidity and make a substantial fund available for investment. However, some scholars have stressed that the sustainable inflows of portfolio investments and their impact on growth depend on the extent to which the recipient country can develop its local financial markets. As a result, this chapter aims to determine the moderating role of local financial markets in facilitating the effects of portfolio investments on economic growth in 28 SSA between the period 1995-2018. The study employed the system generalized method of moments (SGMM) and found that portfolio investments positively and significantly impact economic growth. However, the study observes that the interaction between portfolio investments and financial market development is negative and significant, presupposing that the relationship between portfolio investment and economic growth is not contingent on local financial markets.

In this chapter, a sample of firms active in the Spanish information and communication technology sector during 2003-2014 is analyzed to assess whether foreign subsidiaries are more prone than domestic firms to cooperate for innovation with local partners and ascertain which type of partners they prefer. Results of an econometric model show that foreign subsidiaries are more likely than unaffiliated domestic firms to cooperate for innovation with local partners but not more likely than domestic business groups, even when the size of the firm, the obstacles it faces to innovate, and other factors that may influence cooperation are all controlled. Statistical tests show that foreign subsidiaries prefer partnerships across the value chain. This preference is compared to that of domestic companies.

The global business environment has become more mindful of present-day cookware risks. Such risks as nickel and chromium draining from hardened steel pots have resulted in a rebound of nourishments of conventional materials like copper, iron, stone, and dirt into Indian kitchens. Changing business perspectives and consumer needs have motivated this trend resulting in developing interest in brands representing considerable authority in legacy cookware. This chapter reviews the applicability of business process reengineering (BPR) and its challenges in India, focusing on traditional industries. The study adopts a multi-criteria decision-making (MCDM) to identify and confirm the top difficulties and variables influencing BPR execution in conventional efficient earth, copper utensils. The study found out that, for BPR to succeed, it is imperative to have a sufficient IT foundation and lucidness in the continuous procedures and practices. The chapter further establishes how various BPR elements can be organized to achieve significant efficiency, cycle times, quality, and cost reduction.

Industry features are considered by Porter, Schmalensee, and many other scholars as the determinants of effective strategy formulation and implementation. While industries are widely different from each other, some common features shape all existing and future industries. This chapter aims to identify these common building blocks of industries and their possible effects on strategizing for the future in a fast transitioning business world. The chapter employs a systematic literature review from the top related journals with at least one of the nine keywords about the industry. The chapter reviews 47 factors or characteristics that form every industry. These industry features are grouped into ten sets of elements, which shapes the ten forces framework, reflecting the interaction among building-blocks of the industry with each other and with strategy implementation practice inside an organization. The chapter concludes by proposing the 'macro-environment, industry, and organization' (MIO) model, which could be utilized by integrating three levels of analyses.

Analyzing corruption is a topic of interest to many and is indeed very complex due to its inherent difficulties with its identification and quantification. Past studies present several variables, indices, computational models, and approaches, but their relevance in the fourth industrial revolution (Industry 4.0) has been debatable. This chapter addresses the need to revisit the mathematical models and approaches in the Industry 4.0 context. The chapter provides a foundation for this argument through a compressive literature review followed by a proposal of a three-stage concept for corruption identification. The chapter illustrates two case studies from which a strong justification derives for considering the digital transformation and use of big data to deal with corruption and improve the external and internal perceptions about corruption in general.

Preface

As more companies shift their operations between countries to take advantage of lower costs and huge profits, the global market continues to change rapidly, resulting in global hyper-competition that can be detrimental to a business. The global environment has witnessed accelerated internationalization by the *born global* and the *born-again* global firms, whose internationalization efforts have accelerated disruptive technologies. This trend continues across various Small and Medium-Sized Entrepreneurial ventures, manufacturing, logistics and supply chain, financial, tourism, and other service sectors. Firms that have managed to navigate the added costs and risks associated with global transitions have witnessed growth compared to those who have decided to serve their domestic markets. In their study entitled, "Navigating liminality in new venture internationalization," Prashantham and Floyd (2019) described the firms who compound their business risks through pursuing aggressive global growth from venture inception as "a perplexing phenomenon."

Against the emergence of the novel Corona Virus Disease (COVID-19), firms (global or non-global) have had to strive under challenging conditions, fuelled by socio-environmental evils such as corruption and environmental degradation. Such pandemics have become vital in diving global transitioning and innovativeness – no doubt about it! The adoption of emerging smart and disruptive technologies has therefore become inevitable. These technologies have presented global growth opportunities, despite the cost and other challenges coming along with them.

Thus, firms need to remain updated with the latest research as they navigate global cultural differences, pandemics, communication challenges, and inconsistent standards to thrive. *Advanced Perspectives on Global Industry Transitions and Business Opportunities* is an essential, comprehensive reference book that explores the current global business environment and its challenges due to contemporary globalization and the resultant global hyper-competition. With a broad scope, the book covers the implications of industry transitions from small and medium-sized companies to multinational businesses and large enterprises and discusses opportunities for both born global and born-again global firms. The book features topics that deal with innovation, digitalization, disruptive technologies, international collaboration, and emerging management concepts in an era of global transitions.

ORGANIZATION OF THE BOOK

The book comprises 13 chapters that focus on different areas related to global transitions. The diversity of the book chapters' authorship presents a strength that cannot be easily matched. The book chapter authors and reviewers are drawn from different parts of the world, including Australia, Turkey, South Africa, Spain, Portugal, United Kingdom, Namibia, Nigeria, Norway, and India.

The first chapter of the book sets the scene for global transition research for disruptive technology, focusing on 3D Printing Innovation. Authored by Jennifer Loy, James I. Novak, Moira Scerri, Md Maruf Hossan Chowdhury, and Katrina Skellern, the chapter introduces transitioning companies' issues to working with emerging digital manufacturing technologies through the example of 3D printing. The chapter provides an argument for the development of transition research across disciplines that identifies and explores the integration challenges involved in maximizing the opportunities of 3D printing, drawing examples for the health and other industries. The authors make recommendations based on their research into supply chain management and operations in devices manufactured using 3D printing.

Grounded in global transition, the second chapter authored by Cheryl M. Cordeiro discusses emerging management practices in the context of natural resources management in international business. The chapter reviews the literature on the co-management of natural resources and contextualizes the Swedish management style in multinational enterprises. The chapter highlights management best-practice approaches in working contexts that work well in a global transition period, based on empirical data.

Co-authored by Gülsüm Akarsu and Fanny Saruchera, Chapter 3 demystifies the general perception that tourism is a green industry in a world where profits are preferred to people and the planet. This chapter attempts to analyze the effects of tourism value chain activities on carbon emissions in the context of the environmental Kuznets curve for G20 countries using a ten-year dataset. Given the growing global transitions within the sector, the chapter unpacks the authors' informed decisions regarding the sector's need to focus on sustainable tourism as a development and improvement strategy.

In Chapter 4, the authors (Ana Vieira, Ema Fonseca, Inês Oliveira, Joana Lobo, and António Carrizo) start by reviewing the literature relating to the Uppsala model, born-again globals, non-linear internationalization model, and late market entry. The authors aim to portray the history, changes, and adaptations of OMEGA's internationalization process – a transitioning firm that manufactures furniture and wooden hockey sticks. This chapter identifies that OMEGA follows a non-linear internationalization process and late entry into international markets. The principal added value of the case study presented here is related to presenting OMEGA's non-linear internationalization process, which displays reactive internationalization behavior in response to a saturated domestic market, typical of the Uppsala model, and which subsequently ends in a rapid internationalization process, as a born-again global, as a result of a change in its top management. The chapter presents lessons for other would-be born-again globals regarding changing the internationalization pace, modes of entry, and export actions by adapting to the external environment and then changing its strategic focus.

In Chapter 5, Ana Inês, Maria Hespanha, Patrícia Pires, Andreia Almeida, and António Carrizo Moreira explore the gaps in the literature on Born Global (BG) micro-enterprises' behavior on their internationalization trajectory. The chapter analyzes the case of a micro-company based in Aveiro, Portugal, that follows a passive internationalization path to embrace a BG's typical behavior. This chapter adds value by explaining how a micro-enterprise manages to overcome its passive behavior and evolve into a BG company.

In Chapter 6, Arild Aspelund, Øyvind Bjørgum, and Erik Andreas Saether investigate the key motivations, drivers, and barriers for firms seeking to enter new global supply chains renewable energy. The authors explain how they adopted a mixed-methods approach by first doing 11 case studies of Norwegian industrial companies, and secondly, by conducting an online survey targeting the whole population of Norwegian firms in wind energy. The chapter presents how new green industries' distinctive features, managerial motivation, and industry relatedness shape a firm's entry strategies and behavior. Risk and uncertainty, complexity and turbulence, high transaction costs, and disadvantages of scale postpone industry entry from established actors. Finally, the chapter expands on how to market relatedness is more critical than technological relatedness.

Chapter 7, authored by Halit Alper Tayali, is entitled "A Novel Web-Based Decision Support System for Aggregate Production Planning Problem." In this chapter, Halit presents a novel decision support system for the aggregate production planning model using the linear programming approach. The aggregate production problem modeled by the linear programming has been coded in R computer programming language, and a novel web application has been developed using Shiny to serve the needs of the production managers. The novel application is adjustable for any production setting and planning horizon for firms in global transitioning.

In Chapter 8, Nilüfer Serinikli presents on the changing entrepreneurship in the era of digitalization. The global transition has resulted in global hyper-competition competition between enterprises. As a result, entrepreneurs striving to survive in the global competition have begun to invest in "digital" competition, which differs from traditional entrepreneurship as it does not require large amounts of capital for its establishment. Nilüfer Serinikli focuses on the differences between digital and traditional enterprises, emphasizing the importance of digital enterprises, and presents digital enterprises' strengths and weaknesses in relation to the corresponding opportunities and threats.

Turning to Sub-Saharan Africa, Chapter 9 explores the role of local financial markets in the portfolio investment-growth nexus. Authored by Friday Osemenshan Anetor, Simeon Oludiran Akinleye, and Folorunso Sunday Ayadi, the chapter argues that the transitioning times have seen foreign portfolio investment inflows considered pivotal to sub-Saharan Africa's growth (SSA) as they help enhance liquidity and make a substantial fund available for investment. This chapter aims to determine the moderating role of local financial markets in facilitating the effects of portfolio investments on economic growth in 28 SSA between the period 1995-2018. The study employed the System Generalized Method of Moments (SGMM) and found that portfolio investments positively and significantly impact economic growth. However, the study observes that the interaction between portfolio investments and financial market development is negative and significant, presupposing that the relationship between portfolio investment and economic growth is not contingent on local financial markets.

In Chapter 10, Antonio García-Sánchez and Ruth Rama are determined to address the question, *are Foreign Subsidiaries Cooperating for Innovation with Local Partners?* With evidence from the Spanish ICT sector, the authors assess whether foreign subsidiaries are more prone than domestic firms to cooperate for innovation with local partners and ascertain which type of partners they prefer. With the aid of an econometric model, the chapter narrates how foreign subsidiaries are more likely than unaffiliated domestic firms to cooperate for innovation with local partners but not more likely than domestic business groups, even when the size of the firm, the obstacles it faces to innovate, and other factors that may influence cooperation are all controlled.

Smruti Ranjan Satapathy, Suchismita Satapathy, Meghana Mishra, and Pravudatta Mishra, the authors of Chapter 11, unpack Business Process Re-engineering (BPR) and its challenges in India, focusing on a study of Indian traditional industries. The authors review the applicability of Business Process Reengineering (BPR) and its challenges in India, focusing on traditional industries. The study adopts a Multi-Criteria Decision-Making (MCDM) to identify and confirm the top difficulties and variables influencing BPR execution in conventional efficient earth, copper utensils. The study found out that, for BPR to succeed, it is imperative to have a sufficient IT foundation and lucidness in the continuous procedures and practices. The chapter further establishes how various BPR elements can be organized to achieve significant efficiency, cycle times, quality, and cost reduction.

As the book draws towards the book's conclusion, Reza Aboutalebi, the author of Chapter 12, attempts to identify the standard features that shape all existing and future global industries. This chapter aims to identify these common building blocks of industries and their possible effects on strategizing for the future in a fast transitioning business world. The author unearths 47 factors or characteristics that form every industry. These industry features are grouped into ten sets of elements, which shapes the Ten Forces Framework, reflecting the interaction among building-blocks of the industry with each other and with strategy implementation practice inside an organization. The chapter concludes by proposing the 'macro-environment, industry and organization' (MIO) model, which could be utilized by integrating three levels of analyses.

Analyzing corruption is a topic of interest to many and is indeed very complex due to its inherent difficulties with its identification and quantification. With increasing global complexities, corruption is also becoming complicated. In Chapter 13, Arpita Patra, Lovemore Matipira, Fanny Saruchera, and KS Sastry Musti conclude the book by justifying the fading relevance of the past corruption computational models and approaches in the fourth industrial revolution (Industry 4.0), an era of global transitioning. The authors address the need to revisit the mathematical models and approaches in the industry 4.0 context. The chapter provides a foundation for this argument through a compressive literature review followed by a proposal of what the authors describe as a "three-stage" concept for corruption identification. The chapter illustrates two case studies from which a strong justification derives for considering the digital transformation and use of big data to deal with corruption and improve the external and internal perceptions about corruption in general.

CONCLUSION

This book provides insights concerning the current global business environment and its challenges due to contemporary globalization and global hyper-competition. The book presents leading-edge and essential topics that deserve a reflection, and this book presents an opportunity for the readers to appreciate not only how global transitioning is taking place but also appreciate the opportunities presented by the same. The book presents several topical issues from different perspectives, cultural backgrounds, and contexts, making the book live to its *global transitions* title.

This book is an ideal source for executives, managers, entrepreneurs, global businesses, and businesses looking to transition to the global market, academicians, researchers, and students intending to appreciate the opportunities, experiences, and challenges presented by global industry transitions and disruptive technologies. The authorship's diversity makes the book a *must-read* to anyone serious about global transition and disruptive technologies in production, supply chain management, and tourism, among other sectors of the economy.

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To my family: thank you for your unwavering support. This project is dedicated to you and all the current and future readers of this book.

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Chapter 1
Developing Transition Research for Disruptive Technology:
3D Printing Innovation

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ABSTRACT

There is a disconnect between technical research into digital manufacturing processes supporting the development of product innovation and research into the adoption of these technologies and subsequent products into existing business practices. One of the reasons is the level of technical and business knowledge required for an integrated response to the challenges involved in their adoption into established industrial contexts. This chapter introduces transitioning companies' issues to working with emerging digital manufacturing technologies through the example of 3D printing (additive manufacturing). The chapter provides an argument for the development of transition research across disciplines that identifies and explores the integration challenges involved in maximizing the opportunities of 3D printing. Examples discussed are from the surgical, dental, and hearing aid industries. The recommendations are based on the authors' research into supply chain management and operations in medical devices manufactured using 3D printing for the Association for Supply Chain Management (ASCM).

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INTRODUCTION

Transition research is currently dominated by longitudinal studies that monitor and evaluate conditions as they change over time (Zolfagharian, Walrave, Raven, Georges, & Romme, 2019). Whilst worthwhile, this can result in a body of research that is observational in nature and lacks proactive impact. An issue for transitional research as a discipline, therefore, is how to support the development of Action Research in transition studies, supporting researchers in proactive engagement with a problem (McNiff, 2013). This is a pertinent question at this time due to the complex problems identified for society by researchers, such as sustainability, the rising cost of healthcare and globalization, and because of the difficulties of predicting future practice in a period of intense change. According to Cameron (2017, p.83), society's ability to imagine the future is being overwhelmed by the myriad of changes in interaction and organization that digital technologies are creating over a short period of time: "Our leaders need to be able to think on new, fast-moving timetables. The education/skills training implications of engaging seriously with the disruption scenario we are discussing stand out as immediate challenges for policymakers thinking ahead." Proactive transition research is needed to help anticipate, and effectively manage, change in a digital era.

Over the last two decades, developments in digital technology have facilitated disruptive innovation in business practices across industries. The challenge for companies is no longer in recognizing the disruptive potential of digital technologies, but rather in pre-empting its negative impacts and maximizing the opportunities for their industries and business practices. This is not an easy task. There are numerous examples of companies that tried, but ultimately failed, to understand an emerging digital landscape. Other companies have responded effectively, but still face unexpected consequences for their businesses, requiring radical operational reorganization. Professional development is required to help organizations when they need to shift from incremental to paradigm change strategies in their response to the opportunities and challenges of disruptive digital technologies. There is a need for better integrated transition research across academic disciplines. This chapter highlights this need, through the lens of 3D printing (additive manufacturing) and provides an argument for additional education for interdisciplinary teams on:

- Technical knowledge on digital fabrication technology for all transition research team members.
- Appropriate transition research methodologies and methods.
- Working practice for cross-disciplinary teams.

Background

Transition research provides a historical review of specific periods of significant change. This allows for an objective review of the signs and signifiers that preceded the change, the drivers for that change, the perspectives of stakeholders and the activities involved in the change and the consequences and differences that followed. It is a valuable tool for understanding the turning points for large events, such as political and industry, or company specific events. One of the difficulties for researchers in this field is defining the start and end points of a longitudinal study. Described by the Gartner Hype Cycle (Fenn, & Raskino, 2008), the graph made famous for describing the adoption of new technologies, following initial excitement there may be a lull in activity that is subsequently revitalized. As a result, most studies are ten to thirty years and in some cases over thirty years to capture this entire cycle of adoption (Zolfagharian et al., 2019).

Transition research is not always historical. It can be based on the observation of change as it occurs or it can actively intervene in a situation to study the impact of a transitional period on stakeholders and organizational practice (Van de Ven, 2017). For transition research engaged in intervention, the parameters are different. Rather than an observational study, the work can be based on an Action Research methodology (Wittmayer, & Bartels, 2018, Kemmis, 2016). Where the scientific method of research involves proposing a hypothesis and then testing that hypothesis, Action Research involves planning, conducting and evaluating an experiment, then repeating the cycle with adjustments to the parameters based on the earlier experiments and is therefore more responsive (McNiff, 2013). This involves an active intervention. "When we move into complex settings and work with wicked problems that don't have right answers, we have to discover the goals as we pursue them" (Klein, 2017, p.156).

In a digital era, the pace of change is such, and the problems so complex, that transition research based on intervention is needed to provide established companies with support in responding to the changes happening around them. In addition, more transition research that tracks and then tries to understand changes happening in one company, and how the findings could be generalized for other companies, is needed. This is because the unexpected consequences of responding to the opportunities and threats of digital technologies are still relatively unknown. Bucolo (2015, p.204) points out "...I've seen businesses put up too many blockers as to why they can't make the transition, resulting in them getting stuck in a business model that's no longer competitive or relevant."

Transition researchers utilize different theoretical frameworks. These frameworks provide researchers with systems theories specific to developing transition research methods. Key theoretical frameworks for this type of study include the Multilevel Perspective transition framework (MLP) and Technological Innovations Systems theory (TIS). However, it is fundamentally an interdisciplinary field based on systems thinking. As a result, researchers are currently based in various fields. According to Zolfagharian et. al (2019, p.2), there is currently "no agreed list of fields that constitute transition studies, similar to what Fagerberg et. al (2012) observed for the field of innovation studies." Because of this, innovation research theoretical frameworks are frequently used. As much of the transition research currently undertaken is focused on longitudinal studies, then Transition Management theory (TM) is frequently utilized, as this caters for longer-term and multi-generational study (Papachristos, 2014). Where transition research is used to support established companies during the current environment of fast-paced, disruptive change, then cross-sectional research may need to be employed to provide problem framing and complex systems thinking.

An example of where there are gaps in knowledge in transition research is in relation to 3D printing technology, and this has been the focus of research by the authors in a project for the Association for Supply Chain Management (ASCM) during 2019-2020. 3D printing refers to digital fabrication technology. In addition to data communication, data gathering and analytics, the ability to digitally model and then physically fabricate three dimensional objects has also matured over the last thirty years. This is an interesting technology to review in this context because its impact has happened over a relatively short timeframe, with its roots in digital manufacturing processes. It has the potential to disrupt existing businesses and it is not developing along conventional lines. Thus, it is suitable for both observational transition research and transition research interventions. 3D printing is technically known as additive manufacturing (3D printing for some time referred only to a subset of additive manufacturing technology), and was developed in industry and academia by engineering and clinical researchers for aerospace, automotive and medical applications. The focus of research for aerospace and automotive industries was on replicating the characteristics of parts produced using conventional manufacturing techniques with additive manufacturing. This required research to develop the processes and create suitable materials. There has been considerable research in this area, as illustrated by the large number of publications (e.g. Gibson, Rosen, & Stucker, 2014; Chua & Leong, 2014). Similarly, in medical fields 3D printing research has focused on the development of consistent materials and structural characteristics for implants (e.g. Milewski, 2017), with the opportunity to 3D print custom implants to suit the unique needs of individual patients on a case-by-case basis (Tack, Victor, Gemmel, & Annemans, 2016; Martelli, Serrano, van den Brink, Pineau, Prognon, Borget, & el Batti, 2016). Overall, there are currently seven families of 3D printing recognized by the industry, with over forty different processes within those broad categories. Product designs, specific to the different 3D printing technologies, have been developed particularly in the last ten years as the number and type of processes suitable for producing end use parts has grown. The characteristics of those parts, and their design for ease of printing, have been the main focus for companies looking to integrate 3D printing into their business. These have tended to be niche products, due to the limitations of the technology and materials. Within academia, there has been considerable investment by universities over the last thirty years in the invention of new processes, and development of new materials. In addition, there is a research focus on the validation of parts created using additive manufacturing, processes for quality control.

Accompanying technical research, there has been an explosion of entrepreneurial activity around the technology. This began once the original patent on Fused Deposition Modelling (FDM) expired and low-cost desktop 3D printers were developed. These accessible machines allowed individuals to fabricate a three-dimensional model from a computer file in an engineering plastic such as Acrylonitrile Butadiene Styrene (ABS) or Polylactic Acid (PLA). This is where some confusion began about the capabilities of 3D printing which became a fad, and for several years additional service bureaus burgeoned alongside the relatively long-established ones. The existing bureaus tended to have built their business on prototyping for industry, using technologies such as Stereolithography (SLA). This resin-based technology was particularly suitable for architectural models and for visualizing products prior to manufacturing molds for mass production, mostly due to the good surface quality possible. New bureaus employed banks of FDM desktop printers to service individuals and small companies. This created a dichotomy in the fledgling industry. In addition to local service bureaus, online service bureaus were launched, starting in 2007 with Shapeways[1], offering services to both individuals and companies. They provided access to high-cost metal 3D printing as well as polymers and resins normally outside the reach of a single company, with customers charged for the amount of material used to produce their part, much like a traditional 2D print bureau. The digital nature of the product also meant that it could be designed in one country and printed in another from digital file data.

Traditional information sources, such as established suppliers and competitors, provide guidelines for companies on developments in traditional practices relevant to their business. However, for information on disruptive innovations, such as 3D printing, reliable sources are less readily available. 3D printing, as a digital fabrication technology for manufacturing, has rapidly evolved and the suppliers of the technology are rarely the same as those providing conventional manufacturing technologies (with exceptions, such as Renishaw). This causes challenges in building a reputation and of ensuring longevity for those suppliers. For manufacturing businesses concerned with maintaining currency in an evolving commercial environment, sifting through misinformation for even a basic understanding of digital technology can be a challenge. Online, thirty years after its inception by Tim Berners-Lee (2000), the World Wide Web still lacks regulation, and at a more fundamental level, it lacks organization and hierarchy. This means that a range of information from sources claiming industrial expertise tends to be presented online with equal weighting, whatever the validity of the source material. Metrics based on popularity drives information on a topic to the top, and though search engines can be refined to identify particular aspects of that topic over others, information is essentially unfiltered and egalitarian. One of the issues with this approach to information dissemination is that the reader becomes responsible for checking the veracity of the source material. On a platform where all are concerned with vying for views as a measure of success, the graphic presentation of that material can be at odds with the credibility of the source.

3D printing provides an example of the difficulties involved in understanding the potential opportunities and threats of a disruptive technology for a manufacturer whose business is built on conventional technology. The recent development of end-use, digital fabrication technologies (as opposed to prototyping technologies) is creating not only potential disruption for product manufacturing itself, but for the management and organization of associated industrial supply chains. This will have significant implications for commercial operations in a business as a whole. Yet, by the nature of its very development, there is little understanding of these implications. The issues involved need to be understood in their entirety, rather than as individual aspects of a problem, and there needs to be the development of research and educational strategies to transition businesses more effectively. In particular, there is a need to improve the integration of cross-disciplinary research teams to ensure that in-depth technical knowledge, specific to high impact digital technologies, informs and underpins the development of new business models and organizational planning. According to Zolfagharian et al. (2019):

A transition involves far-reaching structural changes in socio-technical systems that enable particular desirable societal functions (e.g., mobility, energy, healthcare). In this respect, transitions are multi-dimensional processes that often include technological, material, organizational, institutional, political, economic, and socio-cultural changes. As such, transitions typically involve a broad range of actors (e.g., individuals, firms and organizations, and collective actors), institutions (e.g., societal and technical norms, regulations, standards of good practice), and technological elements (e.g., material artefacts and knowledge). (p.1)

They argue that this complexity means that transition researchers contribute to the progress of theory in many different fields, but there is a gap in knowledge about what the methodological challenges are that result "when one builds upon different fields and perspectives with distinct methodological traditions" (Zolfagharian et. al, 2019, p.2). In 3D printing, this translates to the challenges that arise for researchers in technical fields, considering the operational impacts of the technology, and for business researchers, building ideas and conclusions on the adoption of 3D printing in operational models. Similarly, working with clients on products that are only possible because of the advent of 3D printing, the knowledge that they based their ideas on will be limited by their technical and operational knowledge. Unlike developments in manufacturing during the last century, where innovation tended to evolve an element of business practice, such as the product outcome or the supply chain organization, with 3D printing the potential for disruption is more widespread. Yet most publications on additive manufacturing for companies that were considering the technology predominantly focused on direct comparisons of parts between traditional manufacturing practices and additive manufacturing ones, though this is changing (e.g. Achillas, Tzetzis, & Raimondo, 2017). Understanding the complexities involved from each perspective is essential for developing models for transitioning to the new technology for existing companies.

3D PRINTING INNOVATION

Disruptive Innovation

For companies contemplating the integration of 3D printing into their production practice, there are significant challenges that need to be understood and transition research is needed to help organizations understand 3D printing as it applies to their specific situation, and also the potential impact it could have on their operations, from sourcing, to material management, to validation. At this time, 3D printing as an industry needs to mature in order to fund and answer those research questions. Currently the emphasis is on materials development, the mechanics of the processes, and the characteristics of their outputs. Design for additive manufacturing (DfAM) is evolving, and more products designed specifically for 3D printing processes are being created (Diegel, Nordin, & Motte, 2019). However, whilst there is an understanding by product designers and engineers that the technology will disrupt business practice, there has been a disconnect between researchers in the technology and those working in operations. References to the impact of the technology on supply chain management, for example, in high profile design publications on 3D printing, highlight that there will be impacts, but do not provide detail on what they might be. In the book ‘Fabricated: The New World of 3D Printing’ by Lipson and Kurman (2013), for example, the carbon footprints of traditional supply chains for conventional manufacturing are highlighted. The authors contrast this to supply chains servicing 3D printing:

Warehouses that hold unsold and unused inventory consume electricity for heating, cooling and lighting. Replacing physical inventory with digital inventory would green the supply chain. Physical inventory not only needs to be transported, it also takes up a lot of shelf space while it waits. In contrast, a digital inventory – or design files for a 3D printed machine part – is cheap and easy to store and transport. 3D printing technologies could help clean up the manufacturing process if their unique capabilities are put to use. (Lipson & Kurman, 2013, p. 206)

These claims are interesting in relation to supply chain innovation, with the focus on reducing spare parts inventory echoed in additive manufacturing publications (e.g. Khajavi, Holstrom, & Partanen, 2018) but with no other reference to supply chain operations in the book, it suggests a lack of emphasis on the topic for the product design readership. As Delic, Eyers and Mikulic (2019, p. 605) concluded in a review on the impact of additive manufacturing in the automotive industry, “for the supply chain, Additive Manufacturing has the potential to enable enormous changes…but as yet there is notably little consensus in the literature over what will be achieved, and a severe lack of empirical evidence on which conclusions may be drawn.”

An example of disruptive innovation that is newly emerging within the dental industry provides a pertinent example. Clear aligners, used to straighten teeth without permanently fixed orthodontic braces, are now widely available through retail outlets and online providers. Brands include SmileDirectClub and Voodoo Clear Aligners (Davies, 2019), and utilize a system of gradually changing clear plastic devices that can be worn while a patient sleeps to incrementally move teeth. While not directly 3D printed, the aligners of these companies are molded over 3D printed molds of a patient’s teeth, with advanced 3D software used to automatically create the incremental stages of teeth movement required, which are then 3D printed. Prior to 3D printing technology there was no cost-effective method of producing the many varied molds of a patients mouth in order to create staged aligners. Traditional orthodontic bracers used a range of mass manufactured metal hardware that was skillfully chosen and applied to a patient's teeth by an orthodontist, using a range of elastic bands and screws to gradually shift teeth over the course of months or years. Regular checkups were required in order to make modifications and monitor progress, as well as provide cleaning. As a result, SmileDirectClub aligners reportedly cost $1895 US, compared to an average cost for orthodontic bracers of $5000 US (Debter, 2019).

Today, 3D printing within the dental industry has been shown to be cost-effective, with new retail business models mitigating the need for patients to visit a specialist orthodontic clinic. SmileDirectClub uses 49 in-house Multi Jet Fusion machines from Hewlett-Packard (HP), capable of producing 500 molds each per print, for a total of 49,000 aligners per day over two print cycles. Voodoo Clear Aligners instead uses SLA resin technology, with 21 Form 2 machines from Formlabs, reportedly producing 20,000 aligners a month for up to 700 patients (Davies, 2019). Such companies have set up in shopping centers and retail spaces, changing the way patients engage with dental treatments, with the digital data from 3D scans instantly transferred to their respective central manufacturing facilities. As demand increases, such businesses can scale up their manufacturing by adding 3D printers to their build farm, all managed by a central piece of software for distributing files for production. The clear aligners are then directly mailed from manufacturer to patient, requiring no professional fitting or store visit. This is a completely new business model and has led to SmileDirectClub raising $1.35 billion US in its initial public offering (Debter, 2019).

This project in itself is a major boost for the 3D printing industry as it has demonstrated the viability of the technology in a competitive consumer market. Yet for transition researchers, this represents more than a shift in thinking for working with the engineering capabilities of the technology; this instead provides insight into the paradigm shift that this technology indicates. Considering the investment in engineering research in additive manufacturing over the last decade, and the prevalence of publications on the democratization of making through the advent of 3D printing (e.g. Dougherty, 2016; Novak, 2019), this is a major gap in terms of understanding the transition from conventional technology to digital fabrication technology. In addition, data-gathering and analysis technologies are reducing in cost and increasing in sophistication. There will be significant implications for sourcing, production, distribution, use and retrieval in the future. This raises the question of how well-informed supply chain innovation specialists are, or can be, in the technology and how effectively they are integrated into engineering teams. The Industrial Internet of Things (Sadeghi, Wachsmann, & Waidner, 2015) is written about both in engineering circles and in business, but how much integration there is between the two remains to be seen. A major challenge is that academic silos, built over the last century, can make it difficult to cooperate and collaborate, as does competition for funding between universities and even between departments. Multidisciplinary may be a popular word in universities, but their organizational operations and metrics need to support the intent. This aligns with the issues of transition research as well as the challenges for innovation research in the past decade.

Adaptive Innovation

While some businesses may struggle to transition to new digital processes and systems, evidence suggests that the shift does not need to be disruptive or result in a divide between companies who embrace a technology like 3D printing, and those who do not. The hearing aid industry is a pertinent example that differs in its adoption of 3D printing to the dental industry, with over 95% of the industry shifting from manual, skills-based manufacturing of in-ear hearing aids, to digitally designed and 3D printed versions, within the period of 2000-2006 (Sandström, 2016). Previously, production of an in-ear hearing aid required numerous time-consuming processes, from an audiologist using silicon to create a mold of a patient's ear canal, to hand-sculpting of a hearing aid by a technician based at a large manufacturer, through to final fitting and minor modifications with the patient (Masters, Velde & McBagonluri, 2006). At each stage, physical goods were produced and shipped to the next vendor, and if a part was lost, either during the manufacture, or later by the patient, the entire process had to be repeated. Unsurprisingly, as materials improved for 3D printing, and machine costs declined, shifting to largely digital processes was beneficial for all manufacturers in the industry, with digital 3D scanning used to capture inner ear geometry from a patient, which could be almost instantaneously uploaded to a manufacturer to use as the basis of designing a hearing aid for 3D printing. As such, the hearing aid became more of a system than a singular product, and since the technologies involved were accessible to all, little advantage was gained by early adoption. In fact, in Sandström's (2016) research into this topic, it was found that latecomers enjoyed up to 60 percent lower costs for software and equipment, and quickly matched the expertise of early adopters who they could copy without making some of the early experimental mistakes.

Compared to similar manufacturing shifts throughout history, this rapid and almost consensual adoption of a new process, complete with a new supply chain and product ecosystem, may be unique. However, Sandström (2016) hypothesizes that many other industries, such as dental, automotive and aerospace, may also be in the midst of shifting manufacturing processes, at least for some components, and early adopters like SmileDirectClub are currently laying the foundations for a broader industry-wide shift over the coming years. As such, transitional researchers could play a vital role in real-time, working with companies to action change and analyze outcomes. The opportunities for customized production, reduced manufacturing costs, and shortened lead times are not unique to the hearing aid industry, and impact can be made rapidly through calculated interventions at the pace of digital bits, rather than physical atoms.

Supply Chain Innovation

The development pathway of 3D printing in medical devices has been driven by biomedical engineers and clinical researchers. In transition research terms it has evolved from the technical study of processes, materials and applications to a gradual awakening of interest in the surrounding environment for the developments and their implications in a broader context. 3D printing has been utilized in the development of medical devices, such as an artificial heart (University of Texas), and implants for hips, knees and other skeletal zones (by companies such as Materialise[2]). It is also used in regenerative medicine (Lieben, 2016). Additive manufacturing of personalized body implants such as hips and knees for each patient has cost implications, as mass-produced parts are currently still much cheaper than 3D printed ones (Martelli et al., 2016; Tack et al., 2016). However, although the initial costs are higher, in part because of the new level of interaction and planning with the patient data required beforehand, the long-term cost of healthcare for that patient can be reduced with evidence showing an improved fit with the patient, improving recovery and reducing the chance for follow-up procedures (Tack et al., 2016). Other costs to factor in are the time the patient is open on the table, which is reduced when a surgery has been pre-planned and custom-fitting implants are used, as are the resultant costs of the surgical theatre, anesthetists, radiologists and nurses (Tack et al., 2016).

In addition, preparatory planning allows the surgeon to specify which tools and parts required for the surgery, reducing the need for instrument sterilization of all tools that may or may not be required during the surgery. The offset of this is the time the surgeon takes in planning the surgery – and the additional education of surgeons and clinical engineers to work with the technology. One of the most significant issues for this example, and a reason that this approach requires sector change, rather than being company specific, is that the system as whole has the potential to benefit society in relation to healthcare costs and improved outcomes, but this move could reduce the income of existing suppliers. If a transition plan does not include upskilling those suppliers, then there will be market resistance to these changes, especially when large manufacturers have such influence over medical legislation and may utilize sales tactics to appeal to surgeons and other health practitioners.

Whilst there are major suppliers who are investing in additive manufacturing technology, such as Stryker[3], the industry still has to make considerable progress overall and such companies are the exception, rather than the rule today. In the meantime, Universities are increasingly working with clinicians to develop service bureaus specific to their needs that bypass existing manufacturers, trialing new ways to bring manufacturing directly to the hospital. For example, The University of Melbourne launched a collaboration with Austin Health, called the Austin Health 3D Medical Printing Laboratory[4] to provide 3D visualization, modelling and printing technologies to enhance patient care. Capabilities include 3D software segmentation, modelling and fabrication of medical devices, implants and surgical guides. The Lab also provides virtual reality tools for visualization, as well as digital technology education for medical and healthcare professionals, and procedural training and simulation and surgical planning tools.

As 3D printing technology has matured, leaders in medical device development have realized that whilst the focus has been on the technical development of products, such as implants and surgical guides, in fact there are critical issues that are sector-wide that need to be addressed in order for the technology to be adopted more broadly. These are both organizational and legislative. In legislative terms, 3D printing is based on the idea of personalized medicine, where implants are individually designed and manufactured to a patient. However, building a patient-specific product is in contradiction to current validation and authorization practices. How does a governing body like the Therapeutic Goods Administration (TGA) in Australia, or the Food and Drug Administration (FDA) in the United States of America, validate that a product is suitable for medical use, when each product is different? Whilst surgeons are technically allowed to provide personalized outcomes during surgery, the development of a viable system for personalized products, based on parametric digital models, is in conflict with current legislation. Surgeons are currently working with legislative bodies to adopt a new model of validation based on a design envelope, whereby extremes of a design are pre-validated, and any product later designed within these extremes is automatically approved for use. As a sector, those involved in the development of medical devices using 3D printing have identified the education of the legal profession and government as critical to progressing the field and adopting such new practices.

Klein (2017, p.155) argues "In well-ordered situations, with clear goals and standards and stable conditions, the pursuit of perfection makes sense. But not when we face complex and chaotic conditions, with standards that keep evolving". This topic is an interesting one for transition researchers. It provides an example that is clearly identifiable as being at the start of a potentially significant period of transition for the sector. There is the opportunity to set up transition research to monitor the changes from the different points of view of the stakeholders. There is also the opportunity to identify a specific issue and develop transition research based on interventions and an action research methodology. However, this raises issues of developing research methodologies and methods based on an informed understanding of the technology.

From a business operations point of view, one of the key sector change requirements will be in the development and introduction of new supply chains. As with the clear aligners example, supply chain organization will be impacted, and as with the hearing aid example, new practices will need to be introduced and supported as entire industries shift manufacturing within a matter of years. In developing these new practices, business management and innovation researchers will need to have a genuine understanding of the relevant technologies. Whilst there is no expectation that supply chain researchers, for example, should have an in-depth technical knowledge, the spectrum of 3D printing processes and applications is such that without more than a rudimentary knowledge of the technology, conclusions made about the impact of the technology on the design of production practices and supply chain planning for a company could be misguided. The inferences made by researchers on the basis of one form of additive manufacturing will be incorrect for another. The term '3D printing' has become a catch-all label for emerging digital fabrication techniques that are different to traditional subtractive methods of fabrication.

From the point of view of a supply chain researcher, the significant technologies are those used in industrial applications. The most established for these are dual filament FDM, Selective Laser Sintering (SLS) for polymers and Selective Laser Melting (SLM) for metals. Whilst other technologies, such as multi-jet fusion (MJF) and stereolithography (SLA), are significant in niche fields, for example MJF in dental and SLA in hearing aids, for the supply chain researchers these are either too new to provide a body of knowledge to study (MJF) or with specialized conditions that limit its generalizability (SLA).

Because of the complexities across the range of 3D printing technologies, there is the potential for confusion in recommendations made for businesses on 3D printing. The most common confusions are:

- The time taken to print a part.
- The geometries possible to print on different machines.
- Materials available for different technologies, including the raw form of these materials suitable for 3D printing (e.g. powders, resins and filaments).

The time taken to print a part is determined by a number of factors: The first is the actual movement of the print head or laser. Some printers have a single print head that must be electromechanically moved, and the support structure for a part is printed by the same head. Therefore, the time for a print may be longer than when a print is completed using lasers and a powder bed, which acts as both part material and support. However, powder-based printers require more time to heat up and cool down, which needs to be considered as part of the total cycle time. Geometries are also different depending on the type of printer used, and whether a technician will be required to manually remove support material, meaning some complex forms may not be possible, or whether drainage holes need to be included to allow excess powder to be blown out of a design and re-captured. The most common confusion is the difference between a part that has been produced on a machine requiring a dedicated support structure and one created with a powder-based process. Yet much of the focus on additive manufacturing is on the design of processes, materials and applications, not on the development of business practices, and still less on supply chain innovation.

Supply chain management research has not had a grounding in 3D printing technology, yet the emergence of the potential of the technology to change business practice has raised its profile in this field. As a result, there are increasing numbers of publications that are written by supply chain specialists on the impact of additive manufacturing. Equally, there are publications written by 3D printing technical specialists that refer to the impact of the technology on supply chains. Based on online industry publications and published academic research, there is an abundance of advice on supply chain management and business practice with respect to the commercial adoption of 3D printing (additive manufacturing).

However, there is evidence of an apparent disconnect between disciplinary research areas in industry and academia, and this has the potential to undermine the value of the recommendations made to businesses on transitioning to digital manufacturing.

Transition research teams need to be created that are deliberately cross-disciplinary. As found through the ASCM project, the researchers should collectively have backgrounds in additive manufacturing for product design, digital technology in medical business practice or another focused industry, and supply chain management and innovation. The intent of the project would be in part to demonstrate the importance of an integrated team, and to ensure the knowledge levels in the team of the different disciplines (in addition to their own) is sufficient that the disciplinary expertise from each discipline can be effectively, rather than superficially, shared. There needs to be research on the knowledge contributed by different disciplines to a period of transition brought about by digital technology innovation, and 3D printing for medical devices provides a good case study. The proposal in this chapter is that the focus should not be solely on the technical research for refining the mechanics or materials of the products, but rather their impact on business practice. Based on previous examples, a study of supply chain innovation in response to digital disruptions would be appropriate for a transition research project by a cross-disciplinary team. A key point, however, is that the contracted timeframe that these disruptions are occurring, requires transition research to be cross-sectional and preferably an intervention, based on action research, rather than a longitudinal study. This is because within proactive transition research, established businesses could miss the opportunity to evolve with the technology, and it is unlikely that entire industries will shift equally in the same way as the hearing aid industry.

Equally, without following through an example as far as possible with a broader outlook rather than a discipline specific one, companies, whole industries or even governments could miss the implications of introducing a technology. An example of this can be illustrated through considering the rise in the demand for 3D printed surgical guides. They are used to plan surgery and guide the surgeon to making the cut, created specifically to fit a patient's unique anatomy. These are useful in creating consistency in surgical practice. When considered purely from this point of view, the technology seems to be innocuous. However, the longer-term implications of the guides could be that a lower level of expertise is needed for an operation where a guide is provided. This could support tele-medicine, where a surgeon is perhaps not available, or result in the education of a new class of surgeon requiring less technical skill and training, similar to that which has arisen with the introduction of Nurse Practitioners working alongside General Practitioners. This approach could also lead to the development of a new level of 'ultra-surgeons', who no longer conduct surgeries, but who specialize solely in designing surgeries and developing surgical guides and custom instruments. This would then impact education, training and accreditation, yet there is little evidence that this has been researched, and stakeholders consulted.

As a starting point, the underlying knowledge of the stakeholders needs to be established. In this case, there are three disciplines involved: The first is the clinicians using 3D printing, the second is the supply chain operations researchers, and the third is the 3D printing specialists. For each group, the level of expertise in supply chain innovation, additive manufacturing, and medical device development needs to be understood. Unlike an empirical study based on previously validated practices, this process, and one of action research-based interventions, requires a degree of endurance whilst the parameters are explored and then rationalized. In a disruptive technology era, researchers will need to become more flexible, adaptive and open as they work through the issues in a period of fast paced change.

NEW PERSPECTIVES

During the last century, businesses tended to evolve new practices incrementally. Innovations added capabilities to companies, but generally structures and operations remained relatively unchanged. In manufacturing, additional machinery and the gradual rise of automation in factories changed the experiences of workers and the capacity of factories, but the biggest impacts on companies were from changes to markets and economies. Over the last twenty years, however, the digital revolution has impacted the viability and longevity of businesses. Where the average length of time an S&P 500 company operated used to be a working lifetime, it is now a third of that, at less than twenty years (Sheetz, 2017). The business landscape is characterized by more extremes, with more individuals dependent on contract work, and companies, such as Google, Amazon and Facebook, creating a new form of market dominance, not possible pre-digital globalization.

Digital communication has changed the exchange of information. Not only in the rate of exchange, but in the control of the flow of information. The ability for individuals to interact en masse has radically rewritten world communications. Alongside communication tools, digital technology has enabled an increase in data collection and data analytics across industries that are changing business practices. For example, sensors in car engines collect data on the workings of the car, that informs the company on the performance of that car individually, but also collectively across tens of thousands of vehicles. This in turn informs future product development, as well as the creation of complementary goods and services, based on the use and lifecycle of that product. In numerous emerging 4D products, such data can also be used to modify product performance in real-time (Novak, Burton, & Crouch, 2019), or autonomously design new products more suitable for specific individuals or situations, known as *responsive design* (Novak, & Loy, 2017).

Essentially, digital technology has created new ways of designing, producing, tracking and distributing that would previously have been inconceivable. Whilst historical changes, such as the introduction of the steam engine and the implementation of assembly line production, had major impacts in the past (Forty, 1986), industrialization was a gradual process. One of the key differences with the digital revolution has been the speed with which changes have taken place. In addition, digital globalization is occurring, but it has not spread gradually across industry sectors and there is an imbalance in the response of organizations. In business, there has been a surge in entrepreneurial activities as new companies find themselves in a more egalitarian landscape, whilst established businesses have to work out how to retain their dominance as the world becomes rapidly more digital around them. Higher education, legislative bodies, security services and many other organizations are struggling to maintain control of their position in society with the challenges that digital technologies have brought. During the twentieth century, there were high profile examples of leading companies who incorrectly anticipated change – either by embracing innovation with too much enthusiasm, or refusing to acknowledge the changes happening around them. Kodak is an example of a high-profile company that understood that digital communication technology would necessitate a change in its business model. It was two hundred years old when digital technology started to impact the business. In response, Kodak invested heavily in-home digital photographic printing and photo books. Whilst they correctly understood digital communication technology would change their business, they did not anticipate that digital technology would change the whole way that people would take photographs, store them and send them to each other. Kodak was cut out of the loop, and Eastman Kodak filed for bankruptcy in 2012 owing an estimated $6.75 billion (Smith, & Yousef, 2012). The challenge for such companies has been summarized by Al Gore, stating that "There is a clear consensus that the future now emerging will be extremely different from anything we have ever known in the past. It is a difference not of degree but of kind" (Gore, 2013, intro).

From the video/DVD rental company, Blockbuster, that filed for bankruptcy in 2010, to the social media website MySpace, overwhelmed by Facebook, numerous companies were unable to maximize their market position in the face of competition that more effectively managed digital technologies.

There is no doubt that change is happening, and at an increasingly rapid rate. Technological advances have in themselves made a dramatic impact on our day to day lives – it wasn't that long ago that we could all live without a mobile phone and just over a 100 years ago we didn't have telephones at all. (Legge, 2012, p.69)

It is possible that the next twenty years will see the collapse of more established companies as new ways of working allow smaller, more agile companies to maximize the opportunities provided by digital technology, unhampered by existing practices. This comes with many associated problems and threats to society, especially as education needs a digital reset (Loy, & Novak, 2019) and much of the online landscape remains unregulated. Rather than allow established companies to collapse in the face of digital transformation, it could benefit society to invest in transitioning these companies to digital globalization, to maintain jobs, at least until education catches up with emerging digital realities.

While digital innovation is a relatively new challenge for businesses to respond to, technological innovation in a broader sense is not a new phenomenon and trying to decide which innovations will have an impact and which will disappear has always been difficult. Yet in the twenty-first century there are differences in kind, speed and scale of change that require a different mind-set and new strategies. This is because it is not just a single technological breakthrough impacting companies, but rather a convergence of technological innovations that are digitally enabled and in constant flux (Brynjolfsson, & McAfee, 2016; Kelly, 2016). The digital revolution has created disruptive change. This is creating opportunities for new companies. For established companies to survive, it is going to be a challenging time, and one that requires new thinking and new research.

Executives may believe that they want insights and innovations but are most receptive to new ideas that fit with existing practices and maintain predictability. Business organizations treat disruptive insights and innovations with suspicion. Witness the initial hostile reactions to the telephone, to Google's search engine, to VisaCale, to the Xerox 914 copier, and to Xerox's rejection of its own personal computers. All these innovations became highly successful, but corporations initially were suspicious of these technologies and tried to dismiss them (Klein, 2017, p.154).

For established companies working to future-proof against the impact of digital technologies on their current business practice, the tools needed are different to those employed in business development over the last two decades. Whereas business innovation specialists have focused on developing companies receptive to ideas from their customers and other stakeholders (e.g. Kelley & Littman, 2006), these approaches have resulted in incremental change, rather than disruptive change. The fundamentals of the businesses have remained the same, but with additional capabilities, such as improved user-experience products and customer interaction services, or the introduction of product service system thinking. Bucolo (2015, p.203), a business innovation specialist in design thinking, states "incremental innovation is essential for these businesses to survive, but survival isn't enough." The implications for business development practices post digital revolution are only just emerging. Based on the disruptive changes that are happening with the integration of digital technologies, even survival may not be possible if only incremental changes are employed, as with Kodak. As the business landscape continues to change with evolving digital technologies, so businesses will need to be open to radical rethinking operations for their survival, over short-term incremental change. “Managing these two mindsets in parallel – today’s business model and a future opportunity is what firms need to overcome constantly” (Bucolo 2015, p 151).

For companies and educational institutions, the ability to manage outputs and mitigate risk has led to increasingly micromanaged accountability and metrics. Yet disruptive initiatives based on digital technologies, such as the Uber[5] platform, have demonstrated that breaking down a field of vision into small pieces can prevent the organization for seeing the bigger picture. One of the key mind-set changes required at this time is the ability to frame and address exponentially far more complex problems, and consider global challenges and opportunities, rather than localized ones. As digital communication, data tracking and analytics are emerging as game-changing technologies, the ability to visualize the end-goals sufficiently to navigate the myriad of connected influences on business development for an industry sector is hampered by a lack of experience of working on such ‘messy’ problems.

In addition to obscuring the bigger picture, traditional organizational structures evolved over the last century have led to companies that can be slow to adapt. This can be because of divisions within companies set up to facilitate interdepartmental communication instead leading to departments seeing themselves as in competition. Universities are a good example, where entrenched silos can make it difficult to innovate new programs, more responsive to educational needs, and where research has to be categorized according to external review systems. As problems become more complex, organizations have to challenge set ideas on operational management and question whether their practices are preventing the company from advancing in a digital age of technological innovation. Essentially, post digital revolution, the conventional silos of organizations need to be dismantled. Interdepartmental teams and cross-disciplinary teams are needed to understand complex problems, but, as Harford (2017, p.54) observes, though effective, these tend to be unpopular for participants:

The diverse teams were more effective, but that’s not how things seemed to people in those teams: team members doubted their answers, distrusted their process and felt the entire interaction was an awkward mess. The homogenous teams were ineffective and complacent. They enjoyed themselves and wrongly assumed because their friendly conversation was smooth and effortless they were doing well.

However difficult interdisciplinary working may be, organizations, including educational and research organizations, need to improve their practices, however disruptive that may be. Building organizational resilience so that companies can build their ability to deliberately be agile and innovative in practice as well as product involves questioning practices, even when they appear to be working: “[companies] need to develop a culture of actively disrupting themselves to realize the missing link, before their competitors beat them to the finish” (Bucolo 2015. p. 154). Winter (2016, p.113), author of One Team, suggests “this isn’t just about teamwork; it’s about creating an environment in which people can learn their way together through uncertainty, ambiguity and disruption. All the while they will be challenging their beliefs and assumptions and feeling the squirm that comes with being in the learning zone.” He argues that major changes in an organization, even in response to technological innovation, are still mostly about attitudes and behaviors: “There are countless books written about change resistance, but they all boil down to one basic principle: people will protect themselves (even unknowingly) against change because they fear loss of identity, status, habit, control, recognition and admiration" (Winter, 2016, p.113).

Radically different digital technologies are difficult for companies to evaluate. Predicting the potential opportunities or threats of a new technology long-term is problematic, even for governments. This is evidenced by current discussion in the UK on the choice of Internet service methods. The government has to decide between ADSL, FTTC and FTTP broadband, which all require different physical infrastructure. The decisions to be made are based on an evaluation of the requirements over time and the values placed on different factors, such as speed and coverage. Whilst debating whether to invest in optic fiber or nano-masts, there is always the possibility that another technology will be developed that negates either investment. For example, Virgin Media are introducing a new type of cable that allows for speeds of up to 10 gigabytes per second (Kellon, 2019) and it is predicted that in the near future speeds in excess of a terabyte per second will be available – beyond the capacity of current infrastructure. There is currently no consensus on what the needs will be for residents and businesses over the next twenty years in the UK or globally – or if a new technological breakthrough will render the entire network obsolete. As Haavisto et al. (2016, p.80) states: "As a result of today's turbulent business environment, companies face potentially significant losses because of unexpected events that render traditional strategies and rules less applicable than before."

The clear aligners example illustrates the unexpected consequences of disruptive technology, with the broader impacts to the dental industry, and more traditional orthodontic practice, currently unknown. To understand an example such as this, transition researchers will need to follow the implications of a disruptive technology far beyond the boundaries of a discipline to identify where changes might happen. The impact on legislation of creating personalized medical devices is an interesting example of this, where the need for a successful introduction of a technical breakthrough was to educate the legislators and develop new ways of working with the technology. Education on resilience in a digital era needs to move beyond conventional design thinking strategies, currently taught in business schools, towards more speculative thinking practices (Dunne & Raby, 2013). The design thinking approach involves engaging all stakeholders in the process to draw on their insight and expertise to better inform the supplier of the service or product. The challenge with disruptive technologies is that existing expertise, however informed from previous practice, does not provide insight into working with these new technologies.

FUTURE RESEARCH DIRECTIONS

This chapter introduces the background for the planning of a research project currently underway that is focused on mapping and understanding the transition of medical device manufacturing from conventional production to digital manufacturing (3D printing). This project involves an interdisciplinary team from business (specializing in supply chain management) and from product design (specializing in additive manufacturing). The research aims to address transition research gaps currently identifiable in the translation of theory to practice for a broader adoption of 3D printing for medical devices.

CONCLUSION

According to historians, societies are hampered by an inability to reframe future scenarios in the face of rapid change. Although there are opportunities for entrepreneurs to reframe practice in response to digital technologies, there are major challenges in translating theory into practice for established businesses. To integrate emerging technologies into existing practice, researchers need not only know about the technology, but new business models based on disruptive practices, and also new models of supply chain management and organization. This is rarely the case as researchers are located in a specific discipline due to the organization of discipline silos in academic institutions. Whilst digital fabrication technologies provide new opportunities for industry, these are accompanied by their own challenges. Informed collaboration across specializations are essential to develop new ways of thinking and working more holistically to help industries transition.

It is arguably more difficult at this time, than any other in recent history, for manufacturers and for educators to develop effective strategic planning to provide a bridge between current and future practice. This is because of three key factors: The first is the pace of change at this time enabled by digital technology, the second is the weight of information available because of global communications, and the third is the valuing of conventional silos of disciplinary research within academic institutions. Creating better integrated research teams, informed by disciplinary knowledge but not constrained by it, will be a necessity for ensuring effective global industry transitions for an increasingly digital future.

Transition research needs to step up in this era of disruptive technological innovation and provide leadership in understanding the implications of the introduction of a technology for the cross-section of stakeholders. The implications need to be modelled, tracked and evaluated through the lens of different disciplines. The rapid pace of change and the complexity of the impact of integrated technology in this digital era necessitates ambitious, cross-disciplinary research to provide insight into the unseen implications of innovation.

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REFERENCES

Achillas, C., Tzetzis, D., & Raimondo, M. (2017, January). Alternative production strategies based on the comparison of additive and traditional manufacturing technologies. *International Journal of Production Research*, *55*(12), 3497–3509. doi:10.1080/00207543.2017.1282645

Berners-Lee, T. (2000). *Weaving the Web: The original design and ultimate destiny of the world wide web*. New York: HarperCollins Publishers LLC.

Brynjolfsson, E., & McAfee, A. (2016). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: W. W. Norton & Company, Inc.

Bucolo, S. (2015). *Are we there yet?* Amsterdam: BIS Publishers.

Cameron, N. (2017). *Will Robots Take Your Job?* Cambridge: Polity Press.

Chua, C. K., & Leong, K. F. (2014). 3D Printing and Additive Manufacturing: Principles and Applications (4th ed.). Singapore: World Scientific Publishing Company.

Davies, S. (2019). *Smilelove & SmileDirectClub discuss the benefit of 3D printing molds for clear aligners.* Retrieved from https://www.tctmagazine.com/3d-printing-news/aligner-start-ups-show-their-teeth-smilelove-smiledirectclub/

Debter, L. (2019). *SmileDirectClub Gets Chilly Reception In Latest Billionaire-Minting IPO*. Retrieved from https://www.forbes.com/sites/laurendebter/2019/09/11/smiledirectclub-ipo/#2e60e0556aca

Delic, M., Eyers, D. & Mikulic, J. (2019). Additive manufacturing: empirical evidence for supply chain integration and performance from the automotive industry. *Supply Chain Management: An International Journal, 24*(5), 604–621. DOI doi:10.1108/SCM-12-2017-0406

Diegel, O., Nordin, A., & Motte, D. (2019). A Practical Guide to Design for Additive Manufacturing. New York City: Springer. doi:10.1007/978-981-13-8281-9

Dougherty, D. (2016). Free To Make: How the Maker Movement Is Changing our Schools, Our Jobs, and our Minds. Berkeley, CA: North Atlantic Books.

Dunne, A., & Raby, F. (2013). Speculative Everything: Design, fiction and social dreaming. Cambridge, Massachusetts: The MIT Press.

Fenn, J., & Raskino, M. (2008). Mastering the Hype Cycle: How to choose the right innovation at the right time (Gartner). Brighton, Massachusetts: Harvard Business Review Press.

Forty, A. (1986). *Objects of Desire: design and society since 1750*. London: Thames and Hudson.

Gibson, I., Rosen, D., & Stucker, B. (2014). Additive Manufacturing Technologies: 3D printing, rapid prototyping and direct digital manufacturing. New York City: Springer.

Haavisto, I., Heaslip, G., & Larson, P. (2016). Supply chain strategy. In I. Haavisto, G. Kovacs, & K. Spens (Eds.), *Supply Chain Management for Humanitarians*. London: Kogan Page.

Harford, T. (2017). Messy: the power of disorder to transform our lives. (Reprint Ed). New York: Riverhead Books.

Kelley, T., & Littman, J. (2006). *The Ten Faces of Innovation: Strategies for heightening creativity*. London: Profile Books.

Kellon, L. (2019). Virgin Media pledges gigabit broadband to millions of homes. *BBC News*. https://www.bbc.com/news/technology-49096856

Kelly, K. (2016). *The Inevitable*. Penguin.

Kemmis, S. (2016). The Action Research Planner: Doing critical participatory action research. New York City: Springer.

Khajavi, S., Holstrom, J., & Partanen, J. (2018). Additive manufacturing in the spare parts supply chain: Hub configuration and technology maturity, *Rapid Prototyping Journal*. doi:10.1108/RPJ-03-2017-0052

Klein, G. (2017). Seeing What Others Don't: The remarkable ways we gain insights. Boston, MA: Nicholas Brealey Publishing.

Legge, K. (2012). *Doing it Differently*. Paddington: Place Partners.

Lieben, L. (2016, April 1). Regenerative medicine: The future of 3D printing of human tissues is taking shape. *Nature Reviews. Rheumatology*, *12*(4), 191. doi:10.1038/nrrheum.2016.29 PMID:26935277

Lipson, H., & Kurman, M. (2013). *Fabricated: The new world of 3D printing, the promise and peril of a machine that can make (almost) anything*. Hoboken, NJ: John Wiley and Sons.

Loy, J., & Novak, J. I. (2019). The future of product design education Industry 4.0. In A. Raman & M. Rathakrishnan (Eds.), Redesigning Higher Education Initiatives for Industry 4.0 (pp. 164–182). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-7832-1.ch010

Martelli, N., Serrano, C., van den Brink, H., Pineau, J., Prognon, P., Borget, I., & El Batti, S. (2016). Advantages and disadvantages of 3-dimensional printing in surgery: A systematic review. *Surgery*, *159*(6), 1485–1500. doi:10.1016/j.surg.2015.12.017 PMID:26832986

Masters, M., Velde, T., & McBagonluri, F. (2006). Rapid manufacturing in the hearing Industry. In N. Hopkinson, R. Hague, & P. Dickens (Eds.), *Rapid Manufacturing*. doi:10.1002/0470033991.ch12

McNiff, J. (2013). Action Research (3rd ed.). New York: Routledge. doi:10.4324/9780203112755

Milewski, J. (2017). *Additive Manufacturing of Metals: From Fundamental Technology to Rocket Nozzles, Medical Implants, and Custom Jewelry*. Springer. doi:10.1007/978-3-319-58205-4

Novak, J., Burton, D., & Crouch, T. (2019). Aerodynamic test results of bicycle helmets in different configurations: Towards a responsive design. *Proceedings of the Institution of Mechanical Engineers. Part P, Journal of Sports Engineering and Technology*, *233*(2), 268–276. doi:10.1177/1754337118822613

Novak, J. I. (2019). Self-directed learning in the age of open source: Open hardware and 3D printing. In E. Ossiannilsson (Ed.), Ubiquitous Inclusive Learning in a Digital Era (pp. 154–178). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-6292-4.ch007

Novak, J. I., & Loy, J. (2017). Digital technologies and 4D customized design: Challenging conventions with responsive design. In V. C. Bryan, A. T. Musgrove, & J. R. Powers (Eds.), Handbook of Research on Human Development in the Digital Age (pp. 403–426). Hershey, PA: IGI Global.

Papachristos, G. (2014). Transition inertia due to competition in supply chains with remanufacturing and recycling: A systems dynamics model. *Environmental Innovation and Societal Transitions*, *12*, 47–65. doi:10.1016/j.eist.2014.01.005

Sadeghi, A., Wachsmann, C., & Waidner, M. (2015). Security and privacy challenges in Industrial Internet of Things. *52nd ACM/EDAC/IEEE Design Automation Conference.* IEEE. 10.1145/2744769.2747942

Sandström, C. (2016). The non-disruptive emergence of an ecosystem for 3D Printing— Insights from the hearing aid industry's transition 1989–2008. *Technological Forecasting and Social Change*, *102*, 160–168. doi:10.1016/j.techfore.2015.09.006

Sheetz, M. (2017). Technology killing off corporate America: Average lifespan of companies under twenty years. *CNBC.* Retrieved from, https://www.cnbc.com/2017/08/24/technology-killing-off-corporations-average-lifespan-of-company-under-20-years.html

Smith, A., & Yousef, H. (2012). Kodak files for bankruptcy. *CNN Money.* Retrieved from https://money.cnn.com/2012/01/19/news/companies/kodak_bankruptcy/index.htm

Tack, P., Victor, J., Gemmel, P., & Annemans, L. (2016). 3D-printing techniques in a medical setting: A systematic literature review. *Biomedical Engineering Online*, *15*(1), 115. doi:10.118612938-016-0236-4 PMID:27769304

Van de Ven, A. (2017). The innovation journey: You can't control it, but you can learn to maneuver it. *Innovation*, *19*(1), 39–42. doi:10.1080/14479338.2016.1256780

Winter, G. (2016). *Think One Team: The revolutionary 90-day plan that engages employees, connects silos and transforms organisations* (2nd ed.). Hoboken, NJ: Wiley.

Wittmayer, J., & Bartels, K. (2018). Critical and relational approaches to sustainability transitions. In Action Research in Policy Analysis: Critical and relational approaches to sustainability transitions. Oxen: Routledge.

Zolfagharian, M., Walrave, B., Raven, R., Georges, A., & Romme, L. (2019). Studying transitions: Past, present, and future. *Research Policy*, *48*(9), 103788. doi:10.1016/j.respol.2019.04.012

ADDITIONAL READING

Anderson, C. (2013). Makers: The new industrial revolution. New York City: Random House Business.

Bitonti, F. (2019). *3D Printing Design: Additive manufacturing and the materials revolution*. London: Bloomsbury Visual Arts.

Christopher, M., & Meindl, P. (2016). Logistics and Supply Chain Management (5th ed.). Upper Saddle River, NJ: FT Publishing International.

Gershenfeld, N., Gershenfeld, A., & Cutcher-Gershenfeld, J. (2017). Designing Reality: How to survive and thrive in the third digital revolution. New York: Basic Books.

Papachristos, G. (2018). A mechanism based transition research methodology. *Futures*, *98*, 57–71. doi:10.1016/j.futures.2018.02.006

Redwood, B., Schoffer, F. & Garret, B. (2017). 3D Printing Handbook: Technologies, design and applications. Amsterdam: 3D Hubs.

Ross, A. (2016). The Industries of the Future. New York: Simon & Schuster.

Straus, E., & Brown, H. (2019). The potential contribution of critical theories in healthcare transition research and practice. *Disability and Rehabilitation*, 1–9. Advance online publication. doi:10.1080/09638288.2019.1700566 PMID:31841058

KEY TERMS AND DEFINITIONS

3D Printing: A range of fabrication processes that build 3D models from computer aided design models, typically in layers.

Additive Manufacturing: The engineering term for 3D printing.

Digital Inventory: In this context, 3D computer files with the data for digital fabrication of a part.

Fused Deposition Modelling: Extrusion-based filament 3D printing technology.

Powder-Based 3D Printing: A range of 3D printing technologies where powder is the part material, and also the support material.

Supply Chain: The entire process of sourcing materials, making and distributing goods.

Transition Research: Research into the multi-dimensional processes that constitute a societal change.

ENDNOTES

1 Shapeways: https://www.shapeways.com
2 Materialise: https://www.materialise.com/en
3 Stryker: https://www.stryker.com/ie/en/index.html
4 Austin Health 3D Medical Printing Laboratory: https://3dmedlab.org.au
5 Uber platform: https://www.uber.com/au/en/

Chapter 2
Emerging Management Concepts in an Era of Global Transitions:
Co-Management of Natural Resources and the Swedish Management Style

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ABSTRACT

In a period of global transition, this chapter discusses emerging management practices in the context of natural resources management in international business. In the past decades, the co-management concept and practice have been of increasing interest to scholars in ecology management and marine environment management. In the late 1980s, the Swedish management style began to be explicitly debated with scholarly interest, particularly in the services industry after observing successful business practices. The literature on the co-management of natural resources and the Swedish management style in multinational enterprises point promisingly towards parallel management strategies applied in distinctly different working environments and contexts. Based on empirical data, this chapter's objective is to highlight and distill from natural resources co-management and the Swedish management style a shared management best-practice approach in working contexts that have multiple actors and stakeholders who hold multicentric agendas.

1. INTRODUCTION

There are many dimensions to the subject of global transition that enables and encourages ideas cross-cutting and integration between different disciplines. Scholars and practitioners in the field of international business (IB) have in the past decade debated about the ongoing developments in the global business

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environments towards greater uncertainty, and if international trade is currently witnessing a retreat of the multinational enterprise (MNE) towards their home markets (The Economist, 2017a, 2017b; Vahlne, Ivarsson, & Alvstam, 2018). In tangent development, scholars and practitioners in the study and management of ecological environments or natural resources have worked towards other management models such as ecosystem services (Elmqvist et al., 2015; Martínez-López et al., 2019), life cycle assessment (Ingwersen, Garmestani, Gonzalez, & Templeton, 2014; Lu & Realff, 2013), product biodiversity footprint (Asselin, 2020; LaCanne & Lundgren, 2018) and ecological modelling (Ingwersen et al., 2014; Koenigstein, Ruth, & Gößling-Reisemann, 2016). Indeed, current global crises such climate change, management of natural resources, global food security and global health seem to indicate that greater interdisciplinary efforts and industry-academic collaborations are imperative.

With a globe in transition towards an increasing awareness of the need to successfully provide solutions to global concerns, this chapter addresses the management practices and ideology needed to effectively work across regional boundaries towards more comprehensive solutions. This chapter follows current academic and practitioner discourse on management models from both the fields of IB and eco-environment sciences. Using existing case examples from natural resources management (Hultberg, 2018) and empirical data collected from 23 top managers working in Swedish founded MNEs with headquarters in Singapore that serve the Asia-Pacific and Southeast-Asian regions (Cordeiro-Nilsson, 2009), the main objective of this chapter is to provide parallel and complementary management thinking from both IB and eco-environment sciences towards a synopsis of management best-practices for future work scenarios.

As management thinking and practices are under increasing pressure for the need to be applied across different socio-economic and cultural contexts, taking into account the perspectives and interests of multiple stakeholders due to global issues (Broszeit et al., 2019; Buller, 2000; Pezzuto, 2019; Reilly, 2015), the suggested novel contribution of this chapter is to help academics and practitioners draw from the experiences of IB and eco-environment sciences towards new management models for global business environments. The working assumption in this chapter is that highlighting common management practices applied to two widely differing working contexts could help reveal a common management best-practice that can be further studied and tested in other working contexts.

This chapter is organized as follows. Section 2 is the literature review, written specifically in address the subjects of (i) co-management as applied in practice in the management of natural resources in the field of eco-environment sciences and (ii) the Swedish management style, as applied in practice in cross-cultural IB contexts. Section 3 describes the methodology used for this comparative study, which is a combination of collected primary interview data and secondary text data such as reports, internet website data and magazine articles. The framework of data analysis is also outlined in Section 3. Section 4 contains 3 sub-sections. These sub-sections give the case examples of the Koster-Väderö Fjord model as an example of co-management practices for natural resources, a text example from a Swedish respondent, $SEM2, who outlines how organization transformation was achieved using Swedish management principles and the last subsection that highlights parallels between co-management and the Swedish management style. Section 5 presents the conclusions, some study limitations, and outlines avenues for possible future research in both academia and industry practices.

2. LITERATURE REVIEW

2.1 Co-Management Studies

There is increasing pressure to create resilient and adaptable socio-ecological systems in an era of uncertainty and change (Asselin, 2020; Butler et al., 2015). Towards this end, the concept and practice of the co-management of natural resources in the field of environmental sciences and management have received growing interest in the past decades (Heenan et al., 2015; Sandström, Crona, & Bodin, 2014). This is due to the recognition that community-based resources inherently involve the interests of multiple stakeholders who perform different management functions, towards a common goal multiple beneficiaries. Co-management is defined as a type of resource governance that is shared by diverse and multiple stakeholders. It is typically a collaborative effort that spans across hierarchies and socio-economic sectors including community, government, private sector enterprises as well as NGOs (non-governmental organizations). It can be seen as part of the participatory management paradigm, institutionalized through national environmental and development policy and legislation in in both developing and developed economies with regards to watershed management (Sims, 2008), small fishery communities management (Marschke, 2009), forest management (Boukherroub, 2018; Coulibaly-Lingani, Tigabu, Savadogo, & Odén, 2014) and peatlands (van Hardeveld, 2018).

Co-management is characterized by the inclusion of relevant stakeholders with expertise and knowledge that facilitate sharper problem definitions. The diverse stakeholders collaborate in a manner that put into practice more transparent decision-making mechanisms in order to achieve higher standards of ethics and integrity with natural resource (Evans, Cherrett, & Pemsl, 2011; Sandström et al., 2014). Co-management has for example, found considerable influence in the fisheries sector (Heenan et al., 2015; Jentoft, 1989; Nunan, 2007), where some studies illustrate that this management style can be used to mitigate conflicts and facilitate joint solutions (Bruckmeier, 2008; Butler et al., 2015). There are over 200 examples of co-management implementations in more 50 developing economies, with over 100 programmes in Asia and 40 programmes across Africa, 46 in Latin America and the Caribbean and 32 in the Pacific (Evans et al., 2011).

Due to the simultaneous and concurrent involvement of multiple stakeholders and community, co-management is seen as an alternative management approach to the normative centralized, vertical hierarchical system of business organizations. A constant challenge for co-management as a management practice is that it is difficult to measure its success and its impacts (Cundill & Fabricius, 2009; Schultz, Duit, & Folke, 2011; Singh-Renton & McIvor, 2015).

2.2 Swedish Management Studies

Research interest and the study of Swedish management in academia began in the mid-1980s. This interest in the Swedish management style grew concurrently with the launch of Jan Carlzon's book, *Moments of Truth* (Carlzon, 1989). Jan Carlzon was at the time, President and Chief Executive Officer (CEO) of Scandinavian Airlines (SAS) from 1980 to 1993. He mapped SAS's winning management strategy under his thought leadership, the main tenant being that organizations would function more efficiently with flatter organizational hierarchies and delegating responsibilities:

"In a changing business environment, you can't wield total control from the top of a pyramid. You must give people authority far out in the line where the action is. They are the ones who can sense the changes in the market. By giving them security, authority, and the right to make decisions based on current market conditions, you put yourself in the best position to gain a competitive edge." (Carlzon, 1989:38)

Carlzon's work was also cited within academic circles as the archetype example of the Swedish management style (Bohman & Boter, 1980; Byrkjeflot, 1997; S. Jönsson & Strannegård, 2009). It was a management style that focused both on employee empowerment, by encouraging employees to take on greater responsibility and take decisions that translates to greater job satisfaction for employees (Carlzon 1989:118):

"…receiving well-defined responsibility and the trust and active interest of others is a much more personally satisfying reward. I believe that by understanding what the employees want from their jobs, what their aims are, and how they want to develop, leaders can heighten their employees' sense of self-worth. And the power behind healthy self-esteem generates the confidence and creativity needed to tackle the new challenges that are constantly around the corner."

The Swedish management style is also one that focuses on customer needs by listening to feedback and bringing more immediate services to the customer (Jönsson, 1995; Jönsson & Strannegård, 2009). The idea for Carlzon is to define clear goals and strategies and then communicate them to employees. As Carlzon wrote (1989:35):

"By defining clear goals and strategies and then communicating them to his employees and training them to take responsibility for reaching those goals, a leader can create a secure working environment that fosters flexibility and innovation. Thus, the new leader is a listener, communicator, and educator… [an] inspiring person who can create the right atmosphere rather than make all the decisions himself."

The importance of communication is strongly emphasized in Swedish management (Carlzon, 1989:88):

"…a leader communicating a strategy to thousands of decentralized decision-makers who must then apply that general strategy to specific situations must go further. Rather than merely issuing your message, you have to be certain that every employee has truly understood and absorbed it. This means you have to reverse the approach: you must consider the words that the receiver can best absorb and make them your own."

Connate studies have correlated findings with Carlzon's Swedish management thought leadership through collected interviews with top Swedish managers. Information about Swedish thought leadership and the Swedish management style were gathered from respondents who worked in different fields, including in the contexts of civil society management (Sjöberg, 2005), public housing management (Hugo Elliot, 2016) and entrepreneurship and firm internationalization (Thygesen Poulsen, Berggren, Dahlberg, & Kierkegaard, 1988). Swedish management were also studied in relation to top management as agents of change (Hugo Elliot, 2016), human values, behavioural psychology (Gustavsson, 1995), professional emotional management (Larsson, 2014) and as orientation towards global-minded leadership (Cordeiro-Nilsson, 2011). Table 1 shows Swedish management characteristics, the context of study / application and select literature references.

Table 1. Swedish management characteristics, context of study and select literature references.

Swedish management characteristic	Context of study	Literature reference
Decentralized / lateral organization hierarchy. Responsibility for decision making is delegated away from the top management to persons directly involved in the work portfolio, and/or project.	Various business sectors i.e. manufacturing technology, banking, shipping, airline, trade (import and export of goods), real estate etc.	Carlzon, 1989; Cordeiro-Nilsson, 2009; Jönsson, 1995; Jönsson & Strannegård, 2009; Thygesen Poulsen et al., 1988
Clear communication of organization values Communicating organization values is important so that all employees are organization ambassadors. Clear communication of organization values and goals enables the delegation of decision-making to employees that empower individuals.	Airline / service industry, healthcare industry	Carlzon, 1989; Eriksson, 2017
Imprecise and unclear The Swedish management style is often described as imprecise. and unclear. It is a characteristic trait that is seen as both a strength and a weakness.	Various business sectors	Cordeiro, 2014; Jönsson & Strannegård, 2009
Informal The Swedish management style is often seen as relatively informal compared to more authoritarian management styles due to the flatter organization hierarchies that give freedom for individual. employees to be creative and take on more responsibility. The challenge comes when some employees prefer to be given clearer guidelines and rules to follow within an organization.	Various busines sectors	Cordeiro-Nilsson, 2009; Furusten & Kinch, 1993; Jönsson & Strannegård, 2009; Thygesen Poulsen et al., 1988; Tixier, 1996
Consensus seeking Even in state governance where following policies, rules and regulations lead towards a more centralized system (compared to a service-oriented industry) an important aspect of successful management is the ability to argue for one's ideas and get as many in the organization to understand the importance of working towards the goal and to keep organizational values / ethics at high standards. This makes for lengthy discussions and what is deemed as "consensus seeking" in Swedish management. It is this sense of loyalty that makes strategic implementation of organizational goals more efficient in the long term.	Various business sectors	Bergquist et al., 2013; Carlzon, 1989; Cordeiro-Nilsson, 2009; Hugo Elliot, 2016; S. A. Jönsson, 1995; S. Jönsson & Strannegård, 2009; Lindell & Arvonen, 1996; Thygesen Poulsen et al., 1988
Impartial and objective Swedish leaders are often observed to be straight forward, honest, objective and fact oriented. Connected to honesty and impartiality is the building of trust within the organization. Swedish leaders needed to trust that others could make sound judgement calls. This means that they do not need to know everything that goes on within the organization. In the event of a mistake occurring however, it is still important in Swedish management that the leaders take responsibility or 'blame'.	Various business sectors	Cordeiro-Nilsson, 2009; Furusten & Kinch, 1993; Jönsson, 1995
International orientation Due to the internationalization of Swedish multinational enterprises (MNEs) in the early 1980s, Swedes were sent as top management to Swedish founded subsidiaries in international business environments. This meant that many were not only organization leaders that carried corporate values, but they were also Swedish cultural ambassadors.	Various business sectors	Carlzon, 1989; Cordeiro-Nilsson, 2009; Furusten & Kinch, 1993; Jönsson, 1995; Lindell & Arvonen, 1996

3. METHOD

In order to compare characteristics of the emerging concept of co-management, a management concept usually applied to the management of natural resources and the Swedish management style usually applied in MNEs in the context of international business, case study examples from Sweden are used.

3.1 Koster-Väderö Fjord Data

The development of Koster-Väderö Fjord, an important fishing ground and national park in Sweden is used as co-management case example. English language text data in the form of reports, website page information and brochures were collected from primary stakeholder websites that include:

(i) Kosterhavets National Park, Länsstyrelsen Västra Götaland (The County Administrative Board of Västra Götaland, Sweden[1]
(ii) European MSP Platform, Fisheries and Conservation, funded by the European Commission[2]
(iii) Swedish Environmental Protection Agency (SEPA), on the subject of "Natura 2000"[3]

A small, but highly specialized and topic specific corpus was created from the total of 12 documents. A small corpus is defined as one that is less than 100 000 words (Aston, 1997; Flowerdew, 2009). The Koster-Väderö Fjord corpus has 11 227 word tokens with 6760 word types. Using a word concordance software AntConc (Anthony, 2019), details of the Koster-Väderö Fjord co-management processes can be studied by using selected keyword-in-context (kwic) analysis, i.e. searching for academic and practitioner identified co-management processes and characteristics such as "multistakeholder", and "conflict dissipation".

3.2 Swedish Management Style Data

In the example of Swedish management style, empirical data comes from interviews collected from 33 respondents at top management level in Swedish founded MNEs who have headquarters in Singapore. 23 respondents are Scandinavian, and 10 respondents are Asian (Cordeiro-Nilsson, 2009). The respondents mainly held organizational positions as *Managing Director*, *Chief Executive Officer* and *Regional Director* etc. and ranged in age from between late twenties to late fifties. Top managers of Swedish founded MNEs were selected as respondents based on the working assumption that top managers are important agents of change with key responsibilities in steering organization management strategies and communication towards organization goals both in short and long term. Interviews for the respondents in Swedish founded MNEs were designed as qualitative interviews based on a relaxed conversational style, the purpose of which is to uncover each respondent's point of view and perspective on reality in their working environments (Burnard, 1991; Kvale, 1996; Talja, 1999). The interviews were transcribed, and a corpus was created. The corpus data for the interviews is larger than the Koster-Väderö Fjord corpus data, with 260 178 words tokens, still falling within the range of a relatively small and specialized corpus database. The word concordance software AntConc (Anthony, 2019) will be used to extract details of selected keywords reflecting the Swedish management style so that kwic analysis can be done. Words such as "consensus seeking" and "lateral hierarchy" are kwic analysis of interest.

4. CASE EXAMPLES IN SWEDEN: CO-MANAGEMENT AND THE SWEDISH MANAGEMENT STYLE

4.1 Co-Management: The Koster-Väderö Fjord Model, Sweden

The Koster-Väderö Fjord is located in the northern part of the Swedish west coast, in the eastern part of Skagerrak. The fjord has depths between 100 and 250 meters within one kilometre from land and the water is connected with the Norwegian trench and the North Atlantic deep waters. The connecting waters to the Atlantic has enabled a rich marine area (Berggren, 2017). With over 6000 different marine seaweeds and animals, Kosterhavet is Sweden's most specimen-rich sea, covering 38 900 hectares. The Koster National Park was established in 2009 in the county of Bohuslän in the region of Västra Götaland at the same time as the Norwegian national park, "Ytre Hvaler" on the Norwegian side of the Swedish border. The nearest Swedish towns to the Koster National Park are Strömstad, Grebbestad and Tanumshede (Hambrey, 2007). The resident population within the Park area is approximately 320 but has an increased tenfold population during July and August, which are the summer tourist months (Lawett, 2009). Fishing and tourism are main industries in this region. Predominantly, fishermen trawl for shrimp (pandalus borealis), but other species commonly caught are Norwegian lobsters (nephrops norvegicus), lobsters (hommarus gammarus), mackerel (scomber scombrus), crab (cancer pagurus) and flat fish (Berggren, 2017).

The Koster-Väderö Fjord has vibrant communities that conduct various socio-economic activities that support regional growth. Even when it was identified by the Swedish government in the 1980s as a potential area for environmental conservation, it was not until 2000 that the Koster-Väderö Fjord Agreement was established. The aim of the agreement was to develop a sustainable fishery industry that was compatible with the conservation values of the region. This agreement was established amongst several actors and stakeholders that included fishermen, scientists, fishery organizations and authorities representing different sections of state governance.

The 1990s was a demanding period of discussions. Amongst the numerous actors and stakeholders, the most challenging negotiations were held between the governing institutions, the local fishermen and fisheries organizations. This was in part due to that the agreement contained areas closed for fishery such as coral reefs. Trawling would be limited to no shallower than 60m depth and only light-weight, small fishing gear would be permitted. These new regulations if imposed were feared to interfere with the livelihoods of the local fishermen. As such, there was a long period of general uncertainty and unhappiness to be addressed.

The different agendas, life contexts and business environments for the actors and stakeholders involved in the Koster-Väderö Fjord Agreement meant that greater understanding of each stakeholder's perspective was needed. To facilitate negotiations, two broad streams of training programmes were created. The first programme conducted by the University of Gothenburg was designed for fishermen in expanding their knowledge of marine ecology and coastal management. The second programme, conducted by fishermen, was designed for scientists, managers, and politicians (in fishery technology and commercial fishery), to broaden their knowledge of the fishing trade and industry in practice. These training programmes created opportunities for all actors and stakeholders to interact and opened an active arena for discussions and concerns. These activities helped contribute towards a more congenial environment, thus helping move forward the agenda and purpose of the agreement. Table 2 shows the

Table 2. Koster-Väderö Fjord Agreement and a select list of co-management communication practices

Actors / Stakeholders	Co-management communication practices
• Fishermen • Local community (farmers and business owners) • Managers from government agencies (legislation for terrestrial and marine nature conservation) – Swedish Environment Protection Agency (SEPA), Västra Götaland County Administrative Board, National Fisheries Board, local Municipalities • Representatives from non-government agencies – fisherman organisation and representation (p. 18 Swedish Fishermen's Association, Koster-Fjord group) • Scientists from research Institutions – e.g. Tjarno Marine laboratory	• Administration of project • Public meetings • Bilateral discussions • Local organization engagement as focal point of communication • Embedded participation – relevant communes and fishing interests have influence over objectives and management. • Bi-directional training programmes (for fishermen and for managers in governing institutions) • Negotiation on legislation, rules to be implemented. • Internet presence • Certification for sustainability standards • Awards in recognition of sustainable practices

various actors and stakeholders involved in the agreement and some of the participative, communicative measures adopted as co-management practice.

Between 2012 and 2013, an assessment and accounting of the impact of the agreement was made. It was found that the protected areas were indeed richer in bio-diversity, with more species recorded than prior to the agreement. There were also new living coral reefs at Väderöarna documented. Demand for locally sourced seafood is strong in Sweden (Jonell, et al., 2016), and there were trawl tracks discovered in closed areas (Berggren, 2017). To strengthen area protection, a special permit was established in 2015 for fishing rights in the area with an obligatory AIS (automatic identification system). Fishermen who did not participate in the training programme and if their boats were not equipped with the obligatory AIS were not permitted to fish in the area. 5 more areas were closed for trawl fishing.

Today, as indication of successful methods of co-management shrimp trawled from the SD Ferder that operates in the Koster-Väderö Fjord is KRAV-certified (KRAV, 2019). The KRAV Standards comply with the European Commission's (EU) regulation for organic production (EC No. 834/2007). In 2009, two local fishermen were awarded the Swedish Coop Änglamark Prize for their efforts to protect the marine environment and inspire others to fish in a sustainable manner (Humphreys & Clark, 2020).

4.2 The Swedish Management Style

Case examples of the Swedish management style are taken from 23 respondents who worked in Swedish multinational enterprises (MNEs) with regional headquarters in Singapore. Sweden had already in the early 1980s begun establishing subsidiaries in the Far East and Southeast-Asia. The strategic geographical location of Singapore has historically, made Singapore a natural international trade hub. Other attractions for Swedish MNEs to establish presence in Singapore are regional market and outreach, a highly educated / skilful human resource base and intelligent smart city infrastructure (Department of Statistics Singapore, 2020; Gwynne, 2005; Triendl & Yoon, 2001).

In a time of a global 2020 coronavirus pandemic, it was reported that a conducive business climate remains for Swedish enterprises based in Singapore (Business Sweden, 2020). Although the market has matured for Swedish MNEs, growth numbers of entering Swedish companies to Singapore has grown due to that Singapore represents a doorway that leads to the greater Southeast-Asian market and emerging markets (Business Sweden, 2020). There are today, about 300 Swedish enterprises established in

Singapore, constituting a mix of small, medium and large companies in various industries, mainly industrial, professional services and consumer companies (SwedCham, 2018). Many Swedish managers in top positions in companies have more than a decade's experience of living and working overseas, in the Southeast-Asian or Asian business environment.

Often, in operations start-up phases particularly during the late 1990s, Swedish managers were assigned to the overseas subsidiaries in top management positions. They were often located away from home at a minimum of 3 years at a time, after which their overseas position was assessed (Cordeiro-Nilsson, 2009). Swedish MNEs that had international presence would were also likely to have employees and other managers with international backgrounds, including colleagues from several different countries who spoke different mother tongues or first languages. People working in such organizations tend to encounter colleagues who not only look physically different from them, but who share a different set of cultural values.

This section gives an extended example (Text Example 1) of a Swedish manager, respondent $SEM2. The respondent explained how she saw her role as Managing Director in a financial sector Swedish company. $SEM2 describes some of the challenges associated with working as Managing Director at the company's Singapore regional headquarters, and how they might solve / approach the context of situation with their local employees. The following transcript is in accordance to the Gothenburg transcription Standard, using standard orthorgraphy (Nivre et al., 2004). The notations in bold in square brackets illustrate coded themes, some of which reflect characteristics of the Swedish management style.

Text Example 1

> $SEM2: the values are swedish / **[company culture]** that's one of the most important tasks that we have / that when we come to singapore from sweden / is to carry the culture /we are called / we are sometimes called culture carriers **[Swedes as 'culture bearers']** / and therefore it's important for us to have swedes or nordic people / you can say it's finland denmark / norway / sweden / can all serve as cultural carriers because we have business in all those countries / so in addition to the business tasks or business responsibilities / we also have the responsibility to transfer or carry over the culture **[tacit knowledge]** / one example I maybe can describe is this / when i took over as general manager in 1998 / so i came over in another position than general manager position / 1998 i was appointed g m for asia **[expert knowledge / specialization]** / and at that point in time / there were more or less nine hierarchic title levels in the company / i mean everything from junior clerk / clerk / senior clerk / junior officer / officer / senior officer / so nine sort of title levels and nine **[hierarchy]** / all levels also had a number of value of annual leave days / as an officer you had one more day than a junior officer / despite the fact that other swedes have / been g ms here / i don't know why they didn't find interest to do something about it / but in the company back home / we have three **[flat / lateral hierarchy in organization]** / so i changed that to three / which means i couldn't take away titles / because that would be very sensitive / but i tacked them in three main levels **[flat / lateral hierarchy in organization]** and i took away all links to annual leave days / it doesn't come from your title / it comes from the number of years in the company / which is the same in sweden / everybody starts from the same level and then you add on due to age and due to position **[hierarchy]** / meaning the responsibility you have / not your title / if you have a big responsibility / you're entitled to two more days / so that i changed / i re-did the entire employment hand book because it was quite singaporean style / it said more or less in every page that everything was at the discretion of the general manager **[vertical organization hierarchy / authoritarian / centralized**

> **decision-making]** / which is not the case in the rest of the company that staff should / the staff have rights and obligations / and these are explained and informed in the company's employment handbook / so i took that away / but what can be applied here / i took it over here / everything cannot be applied because the business here is more limited than back home **[integration]** / so a lot of those changes on the soft side / and then i also changed the organization so that instead of having one boss here and many people underneath / and he was sort of giving instructions to all of them / i took away the boss and opened up so that the responsibility was on more people and everybody had more to say / more to decide over / more influence / but they also exposed more / so customers if they called in directly you have to be able to answer / you cannot go to the boss because he's not there anymore **[giving responsibility / decentralizing power / delegating work]** / so that higher exposure was a bit painful for them / because they were not trained before / so of course that you can only do if you add on education / training **[competence training]** and you give responsibility without taking it back / that you give a service they can take care and i will still have the responsibility **[giving responsibility / decentralizing power / delegating work]** if they make a big mistake / it's still mine **[making mistakes / allowing mistakes]** / but i cannot say okay / you take care of this / but i also check what you do / you cannot do that / so you have to decide if you can decentralise responsibility **[giving responsibility / decentralizing power / delegating work]** and then stay / that took also some time / but now they can / they can **[learning]** /// and i think this will change but it will take time **[change of behaviour takes time]** / that is one of the important things i've tried to change here / it's that i actually take the responsibility even if they make a mistake **[making mistakes / allowing mistakes]** / i actually give the responsibility **[giving responsibility / decentralizing power / delegating work]**/ not only responsibility but possibilities for them to grow as they would like to grow **[learning / employee personal development]** / as they would like to expand / so often i've used that expression / okay this is your box today / find out what you can see out here **[thinking outside the box]** / and actually there are at least two maybe three / definitely two people here on a management level that have taken this opportunity / so before i couldn't see at all that they have this helicopter view / i didn't realise that they could / they had it **[learning on the management side]** / but i've told them okay this is your chance / you have to do what you want to do with it / and as i said / two actually definitely grew into the costume **[learning]** / I enjoy this / and they started to make their own decisions **[decision making]** / they started to be creative **[creativity]** / they started to be unafraid **[learning]** / yeah / big difference

Some recurring themes in Text Example 1 in which $SEM2 characterises the Swedish management style (Table 3) are that Swedish managers are seen as "culture bearers" in their subsidiaries. Swedish managers understand that the Scandinavian system of cultural values are different from those of Singapore, and Southeast-Asia. But in general, MNEs need to create strong corporate values in their subsidiaries in global locations in order to create a sense of corporate culture, identity, and branding. For Swedish MNEs, Swedish top managers are expected to be corporate ambassadors to the overseas subsidiaries in which they were assigned. They were to align Swedish homebased corporate values with their subsidiaries and create ways of doing as closely aligned to ways of doing in Sweden. Due to a multicultural working environment, what most Swedish top managers aim to create is an open and integrated working environment where employees are encouraged to explore and grow their own potential at work. As part of this journey of corporate culture and identity building in the subsidiary, Swedish top managers will need to address the challenges of managing and inspiring a multicultural, sometimes multinational hu-

Table 3. Recurring themes from Text Example 1 that characterise the Swedish management style

Swedish management practices	Management communication practices
Swedish managers as "culture bearers"	To communicate Swedish cultural values and Swedish corporate values (depending on company and industry)
To create lateral organization structures	Re-write the company handbook for employees, change company rules and regulations to reflect a more lateral organization
To transfer Swedish "tacit knowledge"	To make tacit knowledge explicit by raising awareness of behaviour and action through joint activities
Decentralized decision making / delegate responsibilities	To give responsibility to employees and to allow for mistakes
To create a creative working environment	Organize brain-storming creative sessions where employees are allowed / encouraged to "think outside of the box"
Create a bi-directional learning environment	To encourage employees to give feedback to top management

man resource base at the subsidiary. Activities need to be planned that encourages a context of finding common ground between individuals of different national and cultural backgrounds so that everyone can work towards and bolster the corporate goal.

A distinct characteristic of the Swedish management style as given by $SEM2 is how the corporate handbook for employees was rewritten and the structure of the organization was transformed from 9 title hierarchies to 3 levels of hierarchy, which reflected the mother corporation in Sweden. Highlighted as a challenge in this period of corporate transformation was how $SEM2 had to become culturally sensitive and aware of the local national culture and values. There was a lot of interaction and negotiation, where the reward system of paid leave days (or "days off allowance") was pegged not to the job title (as was customary in Asia), but rather to the length of time the individual was employed or stayed with the company. This shift of reward from professional title to loyalty to company or seniority spent as number of years in the company helped convey to the employees that job titles (or "big corporate titles") were differently valued in this Swedish company, relative to the Asian business context where individuals marked with high-ranking professional titles often gained more company privileges.

4.3 Parallel Characteristics: Co-Management and the Swedish Management Style

4.3.1 Contextual Differences

Perhaps the most distinct difference between co-management and the Swedish management style is the context in which these two management practices are applied. The former is usually discussed and applied in the context of natural resources management, whilst the latter is usually discussed and applied in an IB context. Co-management in the Koster-Väderö Fjord model also had to address the numerous, and sometimes, opposing agendas of the multiple actors and stakeholders. Despite the differences in applied contexts of management practices, some shared management practices in both co-management and the Swedish management style are listed in Table 4.

4.3.2 Environment as Beneficiary of Human Action

Both management practices considered the broader environment as a beneficiary of human action and behaviour. In co-management practices, marine conservation and species preservation was important, as was the regional socio-economic development where fishermen's livelihoods needed to be respected. This thinking was reflected in the process of organization transformation in the Swedish management model. During the process of flattening the organization hierarchy, $SEM2 was aware and sensitive towards how employees might be demotivated if their long held professional titles were taken away. In order to maintain employee confidence in the company, the reward system was restructured so that paid leave / holidays were pegged to the number of years of employment, as opposed to prominent job titles.

Table 4. Management best-practices common in co-management of natural resources and the Swedish management style in international business (IB)

Co-management (natural resources)	Swedish management style (international business)
Focus on marine conservation as well as economic regional development.	Focus on integrated corporate culture growth, balancing between local culture and Swedish culture.
Multi-stakeholder active engagement in agenda.	Encouraging employee feedback at all levels of hierarchy
Appointing groups with different responsibilities, working towards a common goal	Creating a more lateral organization hierarchy, so that it broadened individual job portfolios. Shifting reward system to loyalty towards company goals that encourages working towards a common goal.
Consensus-seeking indicative of long negotiation periods to get everyone onboard with the agreement.	Consensus-seeking, indicative of long period of corporate transformation and engaging in talks with different groups of employees, and engaging groups of employees with each other.
Empowering individuals / groups of individuals with a sense of purpose and personal responsibility towards marine conservation as well as regional economic development	Empowering employees to make/take decisions and allowing for mistakes to occur. Encouraging personal growth in employees.
Implementing training programmes by experts of the field in bi-lateral direction i.e. courses by scientists for fishermen and courses by fishermen for government managers and scientists.	Implementing open exchange of ideas in a bi-lateral direction, i.e. between top managers of the organization and employees, so that top managers can learn the challenges faced by employees in frontline services for example.
Continuous learning environment	Continuous learning environment

4.3.3 Active Communication and Engagement of Actors, Stakeholders, and Employees

Consideration of the broader environment as beneficiary of human action meant active engagement by communication. Communication had to be organized along several levels of the organization, that involved multiple actors and stakeholders, for both co-management and the Swedish management style. A sense of community had to be built between groups of individuals working with different agendas towards sometimes opposing purposes and agendas. In the context of co-management of natural resources, this meant creating a common overall agenda. Goals were established where everyone could identify with and agree to work towards such as cleaner oceans, more sustainable fishing practices that ensures long-term socio-economic sustainability and regional resilience. In the context of the Swedish management style, $SEM2 gave the example of how all employees, at all levels of organization hierarchies had to be engaged in the process of organization transformation. The employee handbook was re-written and cultural sensitivities needed to be considered before any action or decision was implemented. To ensure long-term company growth post transformation so that the Singapore corporate values reflected that of the parent company in Sweden, employee welfare and well-being needed to be prioritised. To achieve this, employees were encouraged to give feedback, and to speak with each other. Managers were also encouraged to engage with employees to gain feedback and to understand challenges faced by their colleagues.

4.3.4 Consensus-Seeking and Community Empowerment

In co-management practices, consensus needed to be sought and an agreement reached between different actors and stakeholders that belonged to various sectors of society. By decentralizing decision making and responsibilities, the Koster-Väderö Fjord model empowered the community of fishermen as well as scientists with a sense of purpose, where they could continue to work with their professional agendas. A similar process was found in the Swedish management model in Singapore, where organization communication practices were changed, and a more consensus-seeking style emerged. More open communication channels between managers and frontline service employees meant that knowledge was constantly exchanged. The increased threshold of exchanged knowledge allowed for the company to build its tacit (or 'common') knowledge base, so that everyone knew what to do even when managers were not present to give a definitive decision. The process of distributed responsibilities helped create a more resilient corporate culture in the Singapore subsidiary.

4.3.5 Bi-Lateral Learning

The Koster-Väderö Fjord model had explicit training programmes designed and targeted for bi-lateral learning (Lawett, 2009). Courses on ecology and coastal management were designed by the University of Gothenburg for fishermen, helping them understand the state of current ecology in the region. Courses were also designed by the fishermen for the local community, scientists, and government managers to educate them on industry challenges, and the impact of fishing technology on production capacity. This bi-lateral learning was also found reflected in the Singapore subsidiary through communication practices engaged between top managers and employees. Through designated communication hours and planned activities, top managers were able to discern employee potential and knowledge expertise. This enabled a refining of employee work portfolios, being assigned jobs in which they excelled in performance.

5. CONCLUSION

The current period of global transition and its socio-economic challenges towards a sustainable future calls for increased exploration of efficient management strategies. The main objective of this chapter has been to provide parallel and complementary management thinking from both IB and eco-environment sciences, in order to outline management best-practices for future work scenarios.

The example of co-management of natural resources, a subject of increasing academic and practitioner interest in the past decade and the example of the Swedish management model was compared for management best-practices. The assumption is that common management practices found applied in widely different working contexts could be of value and thus applied to other practical contexts perhaps outside of the fields of natural resources and IB.

The limitations of findings from this chapter are that it is indeed a single-country case example, where both natural resources co-management and the Swedish management style of Swedish MNEs could be said to reflect a “Swedish cultural mindset”. However, national culture alone often does not explain the existence of sub-cultures within a nation. The need to consider the broader environment as beneficiary was found applied in both co-management in Sweden, as well as the Singapore subsidiary in the context of a Southeast-Asian / Asian business environment. Thus, management best-practice could be drawn in this context and is relevant for the fact that the management practice crossed-borders.

As the globe turns increasingly multicentric, with multiple centres of power and decision making institutions, future research on emerging management practices such as natural resources co-management, and the Swedish management style could be subjects of interest.

REFERENCES

Andersson, K. P., & Ostrom, E. (2008). Analyzing decentralized resource regimes from a polycentric perspective. *Policy Sciences*, *41*(1), 71–93. doi:10.100711077-007-9055-6

Anthony, L. (2019). *AntConc (Version 3.5.8)* [Computer Software]. Tokyo, Japan: Waseda University. Retrieved November 15, 2019, from Software website: https://www.laurenceanthony.net/software/antconc/

Asselin, A., Rabaud, S., Catalan, C., Leveque, B., L’Haridon, J., Martz, P., & Neveux, G. (2020). Product Biodiversity Footprint – A novel approach to compare the impact of products on biodiversity combining Life Cycle Assessment and Ecology. *Journal of Cleaner Production*, *248*, 248. doi:10.1016/j.jclepro.2019.119262

Aston, G. (1997). *Small and large corpora in language learning*. Retrieved February 28, 2020, from Scuola superiore di lingue moderne per interpreti e traduttori Università di Bologna website: https://www.sslmit.unibo.it/~guy/wudj1.htm

Berggren, S. (2017). *The Koster-Väderöfjord*. Western Sweden.

Bergquist, A.-K., Söderholm, K., Kinneryd, H., Lindmark, M., & Söderholm, P. (2013). Command-and-control revisited: Environmental compliance and technological change in Swedish industry 1970-1990. *Ecological Economics*, *85*(1), 6–19.

Bohman, H., & Boter, H. (1980). *Hur styrs mindre och medelstora företag*. Stockholm: Arbetslivscentrum.

Boukherroub, T., D’amours, S., & Rönnqvist, M. (2018). Sustainable forest management using decision theaters: Rethinking participatory planning. *Journal of Cleaner Production*, *179*, 567–580. doi:10.1016/j.jclepro.2018.01.084

Broszeit, S., Beaumont, N. J., Hooper, T. L., Somerfield, P. J., & Austen, M. C. (2019). Developing conceptual models that link multiple ecosystem services to ecological research to aid management and policy, the UK marine example. *Marine Pollution Bulletin*, *141*, 236–243. Advance online publication. doi:10.1016/j.marpolbul.2019.02.051 PMID:30955730

Bruckmeier, K., & Höj Larsen, C. (2008). Swedish coastal fisheries-From conflict mitigation to participatory management. *Marine Policy*, *32*(2), 201–211. doi:10.1016/j.marpol.2007.09.005

Buller, P. F., Kohls, J. J., & Anderson, K. S. (2000). When ethics collide: Managing conflicts across cultures. *Organizational Dynamics*, *28*(4), 52–66. doi:10.1016/S0090-2616(00)00005-X

Burnard, P. (1991). A method of analysing interview transcripts in qualitative research. *Nurse Education Today*, *11*(6), 461–466. doi:10.1016/0260-6917(91)90009-Y PMID:1775125

Business Sweden. (2020). Singapore Business Climate Survey 2020. In Business Sweden and SwedCham. Singapore: Author.

Butler, J. R. A., Young, J. C., McMyn, I. A. G., Leyshon, B., Graham, I. M., Walker, I., Baxter, J. M., Dodd, J., & Warburton, C. (2015). Evaluating adaptive co-management as conservation conflict resolution: Learning from seals and salmon. *Journal of Environmental Management*, *160*, 212–225. doi:10.1016/j.jenvman.2015.06.019 PMID:26144563

Byrkjeflot, H. (1997). *Modernisering og ledelse: Om samfunnsmessige betingelser for demokratisk lederskap*. Retrieved from https://books.google.se/books/about/Modernisering_og_ledelse.html?id=CYQ6MwEACAAJ&redir_esc=y

Carlzon, J. (1989). *Moments of Truth*. Retrieved from https://www.amazon.com/Moments-Truth-Jan-Carlzon/dp/0060915803

Cordeiro, C. M. (2014). Innovation, organization transformation and human resource management: A discourse analysis study of Swedish managers in Singapore. *ICMIT 2014 - 2014 IEEE International Conference on Management of Innovation and Technology*. 10.1109/ICMIT.2014.6942448

Cordeiro-Nilsson, C. M. (2009). *Swedish management in Singapore: a discourse analysis study* (University of Gothenburg). Retrieved from https://gupea.ub.gu.se/handle/2077/20233

Cordeiro-Nilsson, C. M. (2011). Developing global-minded leadership: A Swedish perspective. *Singapore Management Review*. Retrieved from https://www.scopus.com/inward/record.url?eid=2-s2.0-84865981987&partnerID=MN8TOARS

Coulibaly-Lingani, P., Tigabu, M., Savadogo, P., & Odén, P. C. (2014). Participatory forest management in Burkina Faso: Members' perception of performance. *Journal of Forestry Research*, *25*(3), 637–646. doi:10.100711676-014-0502-x

Cundill, G., & Fabricius, C. (2009). Monitoring in adaptive co-management : Toward a learning based approach. *Journal of Environmental Management*, *90*(11), 3205–3211. doi:10.1016/j.jenvman.2009.05.012 PMID:19520488

Department of Statistics Singapore. (2020). *Statistics Singapore - Reference*. Retrieved August 20, 2020, from Statistics Singapore website: https://www.singstat.gov.sg/publications/reference

Elmqvist, T., Setälä, H., Handel, S. N., van der Ploeg, S., Aronson, J., Blignaut, J. N., Gómez-Baggethun, E., Nowak, D. J., Kronenberg, J., & de Groot, R. (2015). Benefits of restoring ecosystem services in urban areas. *Current Opinion in Environmental Sustainability*, *14*, 101–108. doi:10.1016/j.cosust.2015.05.001

Eriksson, N. (2017). Hospital management from a high reliability organizational change perspective: A Swedish case on Lean and Six Sigma. *International Journal of Public Sector Management*, *30*(1), 67–84. doi:10.1108/IJPSM-12-2015-0221

Evans, L., Cherrett, N., & Pemsl, D. (2011). Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis. *Journal of Environmental Management*, *92*(8), 1938–1949. doi:10.1016/j.jenvman.2011.03.010 PMID:21531068

Flowerdew, J. (2009). Corpora in Language Teaching. The Handbook of Language Teaching, (November), 327–350. doi:10.1002/9781444315783.ch19

Furusten, S., & Kinch, N. (1993). *Hur formas den skandinaviska ledarstilen?* Uppsala: Univ., Företagsekonomiska inst.

Gustavsson, B. (1995). Human Values in Swedish Management. *Journal of Human Values*, *1*(2), 153–171. doi:10.1177/097168589500100202

Gwynne, P. (2005). International Careers Report: Singapore. *Science*, *307*(5712), 1127–1130.

Hambrey, J. (2007). A review of relevant experience of coastal and marine National Parks Kosterhavets proposed Marine Park, Sweden. *Hambrey Consulting*, (September), 1–28. Retrieved from http://extra.lansstyrelsen.se/kosterhavet/SiteCollectionDocuments/sv/english/case-study-3.pdf

Heenan, A., Pomeroy, R., Bell, J., Munday, P. L., Cheung, W., Logan, C., Brainard, R., Yang Amri, A., Aliño, P., Armada, N., David, L., Rivera-Guieb, R., Green, S., Jompa, J., Leonardo, T., Mamauag, S., Parker, B., Shackeroff, J., & Yasin, Z. (2015). A climate-informed, ecosystem approach to fisheries management. *Marine Policy*, *57*, 182–192. doi:10.1016/j.marpol.2015.03.018

Hugo Elliot, V. (2016). Institutional entrepreneurship and change; A contemporary history of the Swedish banking industry and its performance management systems. *Journal of Accounting and Organizational Change*, *12*(2), 223–251. doi:10.1108/JAOC-06-2013-0059

Hultberg, J. (2018). *Fisket i Koster-Väderöfjorden Interpellation 2018/19:100 Johan Hultberg (M) - Riksdagen*. Retrieved July 14, 2020, from Sveriges Riksdag website: https://www.riksdagen.se/sv/dokument-lagar/dokument/_H610100

Humphreys, J., & Clark, R. (2020). *Marine Protected Areas: Science, Policy and Management*. Retrieved from https://books.google.no/ books?id = SOW2 DwAA QBAJ &pg = PA30 8&lpg = PA30 8&dq = Coop + Änglamark + Prize + 2009 & source = bl&ots = zSLR Yj96 Zo&sig = ACfU3U0 _ 2-BF aEPm Tc _ z8yb PGDD LWMU W5g & hl = no & sa = X & ved = 2ahU KEwj QzPr 9n6f rAhX ul4s KHe- dBtg Q6AE wDno ECAE QAQ #v = onepage &q = Coop Änglamark Prize 2009 &f = false

Ingwersen, W. W., Garmestani, A. S., Gonzalez, M. A., & Templeton, J. J. (2014). A systems perspective on responses to climate change. *Clean Technologies and Environmental Policy*, *16*(4), 719–730. doi:10.100710098-012-0577-z

Jentoft, S. (1989). Fisheries co-management: Delegating government responsibility to fishermen's organizations. *Marine Policy*, *13*(2), 137–154. doi:10.1016/0308-597X(89)90004-3

Jonell, M., Crona, B., Brown, K., Rönnbäck, P., & Troell, M. (2016). Eco-labeled seafood: Determinants for (blue) green consumption. *Sustainability (Switzerland)*, *8*(9), 884. Advance online publication. doi:10.3390u8090884

Jönsson, S., & Strannegård, L. (2009). *Ledarskapsboken*. Stockholm: Liber AB.

Jönsson, S. A. (1995). *Goda utsikter: svenskt management i perspektiv*. Stockholm: Nerenius & Santerus i samarbete med Gothenburg Research Institute (GRI).

Koenigstein, S., Ruth, M., & Gößling-Reisemann, S. (2016). Stakeholder-informed ecosystem modeling of ocean warming and acidification impacts in the barents sea region. *Frontiers in Marine Science*, *3*(JUN), 1–13. doi:10.3389/fmars.2016.00093

KRAV. (2019). *Standards for Production 2019-20 Edition*. Retrieved January 24, 2021 from https://wwwkravse.cdn.triggerfish.cloud/uploads/sites/2/2020/06/krav-standards2019-20v2bookmarks.pdf

Kvale, S. (1996). The 1,000-Page Question. *Qualitative Inquiry*, *2*(3), 275–284. doi:10.1177/107780049600200302

LaCanne, C. E., & Lundgren, J. G. (2018). Regenerative agriculture: Merging farming and natural resource conservation profitably. *PeerJ*, *6*, e4428. doi:10.7717/peerj.4428 PMID:29503771

Larsson, B. (2014). Emotional professionalism in a bureaucratic context: Emotion management in case handling at the Swedish Enforcement Authority. *International Journal of Work Organisation and Emotion*, *6*(3), 281–294. doi:10.1504/IJWOE.2014.065760

Lawett, E. (2009). *The Koster-Väderö Fiord*. Retrieved January 24, 2021 from https://www.fishsec.org/app/uploads/2016/01/OCEAN2012-Environmental-and-social-criteria-for-allocating-access-to-fisheries-resources.pdf

Lindell, M., & Arvonen, J. (1996). The Nordic Management Style in a European Context. *International Studies of Management & Organization*, *26*(3), 73–91. doi:10.1080/00208825.1996.11656689

Lu, D., & Realff, M. J. (2013). The design of a sustainability assessment standard using life cycle information. *Journal of Industrial Ecology*, *17*(4), 493–503. doi:10.1111/j.1530-9290.2012.00539.x

Marschke, M., & Sinclair, A. J. (2009). Learning for sustainability: Participatory resource management in Cambodian fishing villages. *Journal of Environmental Management*, *90*(1), 206–216. doi:10.1016/j.jenvman.2007.08.012 PMID:18079038

Martínez-López, J., Bagstad, K. J., Balbi, S., Magrach, A., Voigt, B., Athanasiadis, I., Pascual, M., Willcock, S., & Villa, F. (2019). Towards globally customizable ecosystem service models. *The Science of the Total Environment*, *650*, 2325–2336. doi:10.1016/j.scitotenv.2018.09.371 PMID:30292124

Nivre, J., Allwood, J., Grönqvist, L., Gunnarsson, M., Ahlsén, E., Vappula, H., . . . Ottesjö, C. (2004). *Göteborg Transcription Standard Version 6.4.* Retrieved September 1, 2019, from University of Gothenburg, Sweden website: https://www.researchgate.net/publication/268503487_Goteborg_Transcription_Standard_Version_64

Nunan, F. (2007). Reducing poverty through fisheries co-management: An analysis of design and intentions in Uganda. *Journal of International Development*, *19*(8), 1151–1164. doi:10.1002/jid.1391

Pezzuto, I. (2019). Turning globalization 4.0 into a real and sustainable success for all stakeholders. *Journal of Governance and Regulation*, *8*(1), 8–18. doi:10.22495/jgr_v8_i1_p1

Reilly, P. (2015). Managing across borders and cultures. *Strategic HR Review*, *14*(1/2), 36–41. doi:10.1108/SHR-07-2014-0042

Sandström, A., Crona, B., & Bodin, Ö. (2014). Legitimacy in co-management: The impact of preexisting structures, social networks and governance strategies. *Environmental Policy and Governance*, *24*(1), 60–76. doi:10.1002/eet.1633

Schultz, L., Duit, A., & Folke, C. (2011). Participation, Adaptive Co-management, and Management Performance in the World Network of Biosphere Reserves. *World Development*, *39*(4), 662–671. doi:10.1016/j.worlddev.2010.09.014

Sims, L., & Sinclair, A. J. (2008). Learning Through Participatory Resource Management Programs: Case Studies From Costa Rica. *Adult Education Quarterly*, *58*(2), 151–168. doi:10.1177/0741713607309802

Singh-Renton, S., & McIvor, I. (2015). *Review of current fisheries management performance and conservation measures in the WECAFC area.* FAO Fisheries and Aquaculture Technical Paper No. 587.

Sjöberg, M. (2005). *Ledarskap och beslutsfattande under stress vid komplexa olyckshändelser inom svensk räddningstjänst : en kvalitativ intervjuvundersökning*. Karlstad: Försvarshögskolan, Institutionen för ledarskap och management Karlstad.

SwedCham. (2018). *SwedCham of Singapore*. Retrieved August 20, 2020, from Swedish Chamber of Commerce Singapore website: https://www.swedcham.sg/swedcham

Talja, S. (1999). Analyzing Qualitative Interview Data: The Discourse Analytic Method. *Library & Information Science Research*, *21*(4), 459–477. doi:10.1016/S0740-8188(99)00024-9

The Economist. (2017a). The multinational company is in trouble. *Economist*. Retrieved from https://www.economist.com/news/leaders/21715660-global-firms-are-surprisingly-vulnerable-attack-multinational-company-trouble

The Economist. (2017b, January 28). Multinationals - The retreat of the global company | Briefing | The Economist. *The Economist*. Retrieved from https://www.economist.com/briefing/2017/01/28/the-retreat-of-the-global-company

Thygesen Poulsen, P., Berggren, S., Dahlberg, E., & Kierkegaard, J. L. (1988). *Den skandinaviska modellen : framgångsrika pionjärföretag*. Svenska Dagbladet.

Tixier, M. (1996). Cultural adjustments required by expatriate managers working in the Nordic countries. *International Journal of Manpower*, *17*(6–7), 19–42. doi:10.1108/01437729610149312

Triendl, R., & Yoon, R. (2001, June). Singapore - From microprocessors to microarrays? *Nature Biotechnology*, *19*(6), 521–522. doi:10.1038/89245 PMID:11385445

Vahlne, J. E., Ivarsson, I., & Alvstam, C. G. (2018). Are multinational enterprises in retreat? *Multinational Business Review*, *26*(2), 94–110. doi:10.1108/MBR-04-2018-0031

van Hardeveld, H., Driessen, P. P. J., de Jong, H., Nefs, M., Schot, P. P., & Wassen, M. J. (2018). How valuing cultural ecosystem services can advance participatory resource management: The case of the Dutch peatlands. *Ecosystem Services*, *34*, 113–125. doi:10.1016/j.ecoser.2018.10.008

KEY TERMS AND DEFINITIONS

Bi-Lateral: In this chapter focuses mainly on "bi-lateral learning" as part of what characterises co-management practice. It refers to a learning that is formed of two-sides, in a reciprocal manner. An example is when employees learn from managers, whilst at the same time, managers can learn from employees. The inspiration and learning motivation is marked by bilateral symmetry of actions and intents.

Co-Management: Is a management concept for the managing of natural resources that is shared by diverse and multiple stakeholders. It is an inclusive management style that actively involves members of the community, government institutions, private sector enterprises as well as NGOs (non-governmental organizations). The potential diversity of interests, resource capacities of stakeholders as well as ground-up voices of communities that have power to influence governance structures is constantly highlighted in co-management models.

Eco-Environment: The word "eco" is an abbreviation for the word, "ecology" which is the science of the relationships between organisms and their environments. The term "eco-environment" is used in this chapter because the abbreviated term "eco" is today combined with other words such as "eco-friendly", and in a completely different context, "eco-drive" which refers to driving a car in fuel-saving mode.

International Business: Or IB refers to the study of companies that engage in cross-border economic activities such as trade, services, technology, and/or financial investments.

Koster-Väderö Fjord: Is an important fishing ground and national park in Sweden located in the Swedish west coast. It is home to Sweden's highest diversity of marine life, between 5000-6000 species and its main industries are sustainable fishing and tourism.

Multicentric: In the context of the discourse on 'power' refers to multiple centres of power that include actors and stakeholders at various levels of society that have influence in policymaking and governance, from non-governmental organizations (NGOs), multinational enterprises (MNEs), small-medium enterprises (SMEs), local communities and the scientific community.

Multinational Enterprises: Or MNEs are companies that have global operations by establishment of subsidiaries. Some Swedish MNE examples are Volvo AB, SKF, Ericsson and fashion giant, H&M.

ENDNOTES

1 Website is available at http://extra.lansstyrelsen.se/kosterhavet/En/Pages/index.aspx)
2 Website is available at https://www.msp-platform.eu/sector-information/fisheries-and-conservation
3 Website is available at http://www.swedishepa.se/

Chapter 3

The Tourism Sector's Impact on Carbon Emissions:

An Empirical Analysis of Transitioning G20 Countries

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ABSTRACT

The tourism sector is generally perceived as a green industry because of its seemingly clean value chain activities. However, despite these perceptions, there have been doubts regarding the environmental impacts of tourism. Past studies have considered these environmental effects due to increasing concerns about global warming and climate change. This chapter attempts to analyze the effects of tourism value chain activities on carbon emissions in the context of the environmental Kuznets curve for G20 countries using a ten-year dataset. The results confirmed the environmental Kuznets curve hypothesis. The findings indicate that, despite increases in energy use and investment inflow, tourism activities decrease carbon emissions. The study concluded that tourism sector activities, foreign trade, and labor force participation all have statistically significant favorable effects on carbon emissions. Given the growing global transitions within the sector, the study reckons the sector's need to focus on sustainable tourism as a development and improvement strategy.

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INTRODUCTION

Tourism and travel sector has been one of the sectors severely impacted by the global COVID-19 pandemic. On the other hand, the contribution of tourism and travel to global economic growth cannot be ignored (Balli, Sigeze, Manga, Birdir, & Birdir, 2019). The sector's value chain activities have undoubtedly contributed directly and indirectly to global economic growth, employment, infrastructure, Gross Domestic Product (GDP) and Balance of Payments (BoP), among other contributions. Over the years, tourism has been generally perceived to be green, and there have been growing literature regarding the promotion of green tourism (Font & Tribe, 2001); the development of green tourism strategy (Chengcai et al., 2017) and green innovations for the sector (Gavrilović & Maksimović, 2018).

Despite these perceptions and developments, certain of the tourism sector's value chain activities have been adversely affecting the environment. For instance, some of the tourism activities such as sea or beach activities have ranked among the top causes of environmental pollution. Other activities have also resulted in greenhouse gas (GHG) emissions, which lead to climate change and global warming (Ehigiamusoe, 2020; Khan et al., 2020). The tourism sector has had a 'mixed bag' of both fortunes and misfortunes. In this context, the 2019 tourism contribution to global GDP was 10.3%, and its share of total exports was 6.8%.1 Between 2009-2013, Lenzen et al. (2018) calculated tourism's carbon footprint share out of global GHG emissions as 8% and the study showed a worrying trend that carbon footprint is increasing over time. Travel related carbon emissions of the tourism sector is three out of four of total emissions caused by tourism activities (World Tourism Organization and International Transport Forum [WTO & ITF], 2019). In 2016, this accounted for 5% of world emissions related to energy consumption (WTO & ITF, 2019).

Tracing Back Climate Change and Global Warming

International and national institutions, non-governmental organizations (NGOs), universities, governments and policymakers have presented various solutions and recommendations to resolve climate change and global warming. Due to population and economic growth post-second World War (WWII), energy consumption and natural resource depletion increased rapidly. In the following years, industrialization has accelerated. In addition to all these developments following WWII, globalization and usage of fossil fuel-based technologies have caused a large amount of environmental degradation which cannot be ignored. Such degradation raised and increased global environmental awareness and showed an urgent need for global cooperation. One can consider United Nations Human Environment Conference held in Stockholm in 1972 as "the first important step taken towards an international cooperation for environmental problems" (Sönmez, 1995, p. 194). However, only after the end of the Cold War period dominated by bipolar World order, there have been some advancements in cooperation (Hoefnagel & Bode, 2011, p. 290). "Since the late 1980s, environmental issues have started to take their place on the international agenda much more, and the concept of sustainable development was first introduced in the United Nations Brundtland Report in 1987" (Porto & Ciaschi, 2020, p. 2). In this context, as climate change is a global problem, after opening for signature in Rio de Janeiro in 1992, "United Nations Framework Convention on Climate Change" entered into force in 1994. For the first time, Parties involved took necessary measures at the international level regarding the fight against climate change. Following this, the Kyoto protocol's signature process in 1998 and the Paris agreement in 2016 were initiated. Since

1995, Conferences of Parties have been held annually. However, no conclusion has been reached in these conferences that would have led to a common solution up to now (Karakaya & Sofuoğlu, 2015).

Considering the role of tourism in the climate change mitigation and adaptation process, the 2007 Davos Declaration on Climate Change and Tourism aimed to include the sector in this process (Porto & Ciaschi, 2020). Besides, as being an essential issue on the agenda and calling for attention in the 21st century, The United Nations World Tourism Organization (UNWTO) has also highlighted the consideration of tourism's impact on climate change and global warming (Kitamura, Ichisugi, Karkour, & Itsubo, 2020). Emphasis has been made mainly on the importance of sustainable tourism. However, OECD-UNEP (2011) documented the lack of consideration of climate change mitigation and adaptation for many countries' tourism policies. This argument was supported by a recent study performed by Becken, Whittlesea, Loehr, and Scott (2020) based on policy document analysis. Becken et al. (2020) further found incorporating the tourism sector in most climate change policy documents. The number of such incorporations increased sharply following the 2015 Paris Agreement due to the submissions of compulsory National Determined Contributions, and more attention was given to adaptation policies compared to mitigation and limited alignment between climate change policies and tourism policies.

In terms of the impact of tourism, analysis of carbon dioxide (CO_2) emissions, which are considered as the most important cause of climate change and global warming (Ehigiamusoe, 2020; Mardani, Streimikiene, Cavallaro, Loganathan, & Khoshnoudi, 2019; Sarkodie & Strezov, 2019; Trenberth et al., 2007), can be a guide in the tourism policies to be proposed. When one examines worldwide CO_2 emissions of different sectors as a percentage of total fuel use,2 electricity and heat generation causes the highest level with 49%. The second one is transportation, with 20.4%. Next is the manufacturing industry and construction with 20%, residential buildings and commercial and public services with 8.6% and other sectors with 2%. Recent studies predict the gradual transition, by the developed World, from heavy industry and agricultural activities, which have intense adverse effects on environmental pollution in economies, to the service sector, which is thought to cause less environmental pollution (Bojanic & Warnick, 2020; Kocak, Ulucak, & Ulucak, 2020). When one considers tourism sector in the service sector, it can be stated that mass tourism and unplanned development of tourism can cause much environmental damage including climate change (Khan et al., 2020; Shaheen et al., 2019).

The increasing effect of tourism on CO_2 emissions has been explained by the energy use resulting from tourists' visit and the changes in waste and land use (Jones & Munday, 2007; Kocak et al., 2020). Emissions may increase as a result of fossil fuel use in energy production and transportation and also because of deforestation resulted from utilization of forest areas for tourism activities (Bella, 2018; Gossling & Peeters, 2015; Paramati, Alam, & Lau, 2018; Khalid Zaman, Moemen, & Islam, 2017). On the other hand, it is thought that it causes lower CO_2 emissions than other sectors and even some tourism types such as environmentally friendly eco-tourism support sustainable development. However, related to eco-tourism, there are some debates (see, for example, Mishra, Sinha, Sharif, and Suki (2019)) related to its adverse effect on the environment such as faster natural resource depletion.

The need for safety and sustainability has been emphasized in tourism and other tourism support sectors, such as transport and logistics (Saruchera, 2020; Saruchera & Asante-Darko, 2021). Many studies have discerned that sustainable tourism is essential in minimizing the environmental destruction of tourism activities and pursue sustainable development. "Sustainable tourism is a broad term that includes many subclasses, themes and concepts including responsible tourism, green tourism, agricultural tourism, slow tourism, eco-tourism, community-based tourism, geo-tourism, volunteer tourism, environmentally friendly tourism, soft tourism and alternative tourism. It takes the development of tourism, taking into account various dimensions such as social equality, economic efficiency and environmental protection" (Khan et al., 2020, p. 5). "2017 was declared as the "International Year of Sustainable Tourism for Development" to raise awareness about the tourism's role in development" (Kitamura et al., 2020, p. 1) in line with Sustainable Development Goals (SDGs) of United Nations (Nepal, al Irsyad, & Nepal, 2019). However, it is critical to ensure that such awareness efforts are not misinterpreted as past studies have shown the unavoidable adverse effects associated with misinformation, mythology and misperceptions on greening the environment (e.g. Chitakunye, Saruchera, Phiri, Takhar-Lail & Derera, 2014; Chitakunye et al., 2014).

The tourism sector has perceived positive effects on environmental protection directly and indirectly by providing investments in more modern transportation infrastructure, renewable energy and water and waste management (Balsalobre-Lorente, Driha, Shahbaz, & Sinha, 2020; Paramati et al., 2018). In this context, by establishing a link between tourism and 17 SDGs, world tourism industry aims to operate with the motto "Tourism for Sustainable Development Goals" (Khan et al., 2020; Kitamura et al., 2020).

The Tourism Sector in COVID-19 and Climate Change Times

The emergence of the COVID-19 pandemic has taken the tourism sector by storm. However, despite this, climate change and global warming have still been the problems calling for solutions and affecting human life and health, biodiversity, and many species' lives at large. There have been some discussions within some parts of the global society, researchers and professionals alike regarding how the COVID-19 pandemic, its sudden effects on the global economy (lock-downs) and the global recovery period could provide an opportunity for transition to a green economy. Therefore, many professionals, policymakers, scientists, international and national organizations, institutions, and countries have tracked issues related to climate change and global warming. Besides interdisciplinary studies, there have been many studies on climate change and global warming from different perspectives.

Research Aim and Questions

This study analyses the impact of the tourism industry on carbon dioxide emissions based on the Environmental Kuznets Curve (EKC) approach. In this context, this study sought the answers to questions such as:

- Which direction and to what extent does the tourism sector value chain impact the environment?
- Which policies should be applied for the development of a sustainable tourism sector considering environmental effects?

In attempting to address these questions, the study tests the following hypotheses: EKC, Pollution Haven Hypothesis (PHH), energy led, the investment-led, and tourism led emissions. The analysis was performed for G20 countries3 covering the period 1995-2014.

There are several reasons for choosing G20 countries for the analysis. First of all, the choice is based on the fact that the G20 countries' contribution of travel and tourism to GDP (as a percentage of GDP) is 91% of World's contribution to GDP (1995-2014)4. On the other hand, on average for the same period, G20 is responsible for nearly 88% of World's CO_2 emissions and has 94% of the World's real GDP.5 Moreover, by 2026, G20 countries, especially China, Germany, the USA and the United Kingdom, are expected to take the vital initiative in international tourism (Anser, Yousaf, Nassani, Abro, & Zaman, 2020). According to 2018 and 2019 United Nations Emissions Gap Reports, these countries have poor performance in reducing their emissions and are away from their emission reduction targets (Warren, 2020). The reports also suggested that as these countries have huge potential, they are expected to contribute well beyond the already determined targets for climate change mitigation.

LITERATURE REVIEW

Climate change and global warming have been the main concerns for many countries due to their well-documented adverse effects on the global economy. Nevertheless, what are climate change and global warming? Moreover, why is it so important to consider them?

"Global warming is the long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere. […] Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates" (NASA, 2020).

It is a global environmental problem that needs solutions over national policies' boundaries and calls for international cooperation, which necessitates international institutions, NGOs, and states' active role. Climate change and global warming affect many species' lives, and it is well known that the leading cause is human activities besides natural processes (Bojanic & Warnick, 2020).

Tourism is one such human-economic activity that can affect and be affected by climate change and global warming. However, following the neoliberal paradigm, the sector has seen to be prioritizing growth over environmental issues (Becken et al., 2020; OECD-UNEP, 2011). Tourism has been defined as "a social, cultural and economic phenomenon that entails people's movement to countries or places outside their usual environment for personal or business/professional purposes" (UNWTO, 2020). There are various tourism types and classifications. These are based on various criteria such as destination, participant numbers, season, organization, duration, transportation type, demographic characteristics of tourists, sustainability, and tourists' purposes. (Tureac & Anca, 2008; Walton, 2018). According to Butler (2000), not all forms of tourism have relations with environmental quality. The author further discussed the effects of tourism on the environment and recommended a more in-depth analysis.

A review of studies on tourism shows that much of the studies have been focusing on tourism and economic growth, tourism and environmental impacts (Paramati et al., 2018) and the relationships between tourism revenues and investments. Among these studies are those investigating the environmental impacts of tourism (Porto & Ciaschi, 2020). The studies are based on various methods, such as questionnaire-based surveys, input-output analysis, computable general equilibrium model, and econometric analysis (Sherafatian-Jahromi, Othman, Law, & Ismail, 2017). There are some theoretical studies, as well. For example, is a pioneering study as noticed by Sherafatian-Jahromi et al. (2017), Pigram (1980) asserted three possible impacts of tourism on the environment which are favourable effects, substantially adverse effects and negligible adverse effects. Built upon the study of Pigram (1980), Tisdell (1987) showed the possibility of non-linear effects of tourism on the environment such as U-shaped and inverted U-shape relation (Sherafatian-Jahromi et al., 2017).

It is generally accepted that one of the first studies that suggest a significant effect of tourism on GHGs is a study by Bach and Gössling (1996) (Kocak et al., 2020). This study focused on CO_2 emissions, which is one of the environmental effects of tourism-related activities, studies using carbon emissions in the literature are reviewed. The literature review showed that the effect of tourism on CO2 emissions was examined within the framework of Stochastic Impacts by Regression on Population, Affluence and Technology (STIRPAT) model, EKC model multivariate time series analysis, panel data techniques, Granger causality analysis and canonical correlation analysis. While the majority of studies have found that tourism causes increase in CO_2 emissions, only few studies have proven otherwise (Lee & Brahmasrene, 2013). On the other hand, some studies showed that tourism sector does not have any effect on CO_2 emissions (for example, Liu, Kumail, Ali, and Sadiq (2019), Gao and Zhang (2019) for Southern Mediterranean countries). The studies' results generally vary based on data used, the period under investigation, country-specific factors (such as developmental level of countries), and method, model, and variables employed (Bojanic & Warnick, 2020).

In this study, the authors focus on the studies which are based on EKC model. Although previously, there were not many studies that include tourism-related variables, which are among the determinants of environmental pollution and which employ EKC approach at the same time, there has been an increase in the number of studies that use this approach (Papavasileiou & Tzouvanas, 2020; Porto & Ciaschi, 2020). The EKC approach was first used by Grossman and Krueger (1991) based on the Kuznets (1955) curve (Porto & Ciaschi, 2020). Panayotou (1993) is among some of the first authors to adopt the EKC hypothesis concept (de Vita, Katircioglu, Altinay, Fethi, & Mercan, 2015). Among previous studies employed different pollution indicators, CO_2 emissions were used by Holtz-Eakin and Selden (1995) for the first time (Papavasileiou & Tzouvanas, 2020). Mardani et al. (2019) provided a systematic review of the relationship between economic growth and CO_2 emissions, also considering studies using tourism as an additional factor. Another systematic literature review was carried out by Papavasileiou and Tzouvanas (2020), but only on the studies based on the EKC model, which considers tourism's effect. The authors stated that analyses were made on a single country at the national or regional level. Some studies consider a specific country group (defined regionally or according to international criteria). They found that 90% of studies under examination used CO_2 emissions as an indicator of pollution, 95% of them added tourism activities as an additional variable within the framework of the classical EKC hypothesis, and 51% of studies showed the validity of EKC hypothesis. In addition, they demonstrated that EKC hypothesis is valid, using data on 86 international tourism corporation and different performance criteria, including the years 2005-2018, at corporation level.

A Review of Past Studies Adopting the Pollution Haven Hypothesis (PHH)

Studies can be classified based on the type of data employed: cross country studies using panel data, one country studies using regional data and studies using time series data. Zaman, Shahbaz, Loganathan, and Raza (2016) performed one cross-country panel study, which proved the evidence of tourism, energy, and investment induced emissions from a panel of 34 developing and developed countries between 2005 and 2013. Health expenditures were found to decrease emissions. For the top 37 tourist destination countries over 1995-2015, Qureshi et al. (2017) showed positive impacts of inbound tourism, international tourism receipts and global financial crisis and negative effect of international tourism expenditures on carbon emissions. Akadiri, Lasisi, Uzuner and Akadiri (2019) found a favourable long-run effect of international tourist arrivals on CO_2 emissions for 15 tourist destination states over 1995-2014.

Furthermore, their findings suggested that energy consumption and globalization increase emissions in the long run. For the top ten tourism-based countries over 1995-2016, Shaheen et al. (2019) found that PHH is valid, and while energy consumption increases emissions, tourism-related activities decrease them. Akadiri, Akadiri and Alola (2019) showed that international tourist arrivals decrease CO_2 emissions in the long run for seven small island states over 1995-2013.

Anser et al. (2020) found that PHH is valid, and international tourism revenues and public education expenditures increase emissions for G-7 countries from 1995-2015. Findings of Leitaoa and Shahbaz (2016) for European countries over 1990-2009 indicated positive and negative effects of energy consumption and tourist arrivals on carbon emissions, respectively. Wang and Wang (2018) showed the importance of energy efficiency improvements to reduce CO_2 emissions for 35 OECD countries over 1995-2014. By implementing energy efficiency, the tourism sector was also found to contribute favourably to emission reduction. Dogan, Seker, and Bulbul (2017) showed the adverse long-run effect of tourist arrivals and energy consumption and the favourable impact of trade openness on carbon emission reduction for OECD countries covering from 1995 to 2010.

For BRICS countries over 1995-2014, although Khattak and Wang (2018) showed the validity of tourism and globalization led growth hypothesis and found that increased tourism receipts lead to higher CO_2 emissions, their findings indicated that tourism investments decrease emissions in the long run. Unlike other studies by considering environmental legal regulations for 18 Latin American countries between 1995 and 2013, Porto and Ciaschi (2020) showed that tourism increases CO_2 emissions in countries where CO_2 emissions are relatively low. However, due to environmental regulations, tourism development decreases emissions in countries where CO_2 emissions are intense.

For 18 Mediterranean countries over 1995-2010, Gao and Zhang (2019) showed that energy consumption statistically significantly increases CO_2 emissions and for only Northern Mediterranean countries, tourism receipts were shown to have adverse environmental effects. Again for 18 Mediterranean countries between 1995 and 2010, in addition to a positive effect of energy consumption on carbon emissions, the favourable impact of tourism receipt only for Southern countries was reported by Gao, Xu, and Zhang (2019). For 12 Asia-Pacific countries over 1995-2013, Shakouri, Khoshnevis Yazdi, and Ghorchebigi (2017) suggested that international tourist arrivals reduce carbon emissions, but energy consumption increases them in the long-run. Zhang and Liu (2019) found adverse impacts of tourism and nonrenewable energy consumption and the favourable effect of renewable energy consumption in the long run for Northeast and Southeast Asian countries between 1995 and 2014. For the Philippines, they showed that tourist arrival reduces emissions. Among the one-country studies, for China at the regional level over 1995-2011, Zhang and Gao (2016) detected carbon emission-reducing effect of tourism receipt and the positive effect of energy consumption on emissions.

Studies based on *time series analysis* also produced mixed results. The analysis by Azam, Alam, and Hafeez (2018) revealed that over 1990-2014, tourist arrivals increase CO_2 emissions in Malaysia in the long run, but for Thailand and Singapore results showed the opposite. For Malaysia between 1981 and 2011, Ng, Lye, and Lim (2016) showed the validity of PHH, adverse effects of international tourist arrivals and energy consumption on environmental quality. Over 1980-2014, Sghaier, Guizani, Ben Jabeur, and Nurunnabi (2019) tourist arrivals do not significantly affect long and short-run emissions for Morocco. However, in Egypt, arrivals decrease (increase) long (short) run emissions while in Tunisia, arrivals increase short-run and long-run emissions. For five *One Belt One Road* provinces of China covering the years between 1991 and 2016, Ahmad, Draz, Su, Ozturk, and Rauf (2018) found that only one province had tourist arrivals contributing favourably to environmental quality. For the other four provinces, tourism increased emissions in the long-run. Bella (2018) concluded that France tourism has a role in reducing emissions in the long-run and short-run between 1995 and 2014. Naradda Gamage, Hewa Kuruppuge, and Haq (2017) confirmed that energy consumption increases CO2 emissions in the long-term. As tourism revenues increase, emissions decrease for Sri Lanka between 1974 and 2013.

For Sri Lanka over 1974-2013, Gamage, Kuruppuge, and ul Haq (2017) found that energy consumption increases carbon emissions both in the long run and the short run, but tourism receipts decrease emissions the long run. Ahmad, Draz, Su, and Rauf (2019) detected that tourist arrivals increase emissions in Indonesia and the Philippines, whereas, in Vietnam, tourism was found to contribute positively to environmental quality over 1995-2014. For Turkey over 1960-2009, de Vita et al. (2015) found that tourist arrivals and energy consumption increases carbon emissions in the long run. However, the negative short-run effect of tourist arrivals was insignificant. For Singapore between 1971 and 2010, Katircioglu (2014) proved that tourist arrivals decrease and energy consumption increases carbon emissions in both short-run and the long run.

There are also studies testing the non-linear effect of tourism. For example, Ehigiamusoe (2020), in his study for 31 African countries between 1995 and 2016, showed that both the international tourism revenues and the number of international tourist arrivals affect CO_2 emissions in a U-shaped and non-linear way. They found that the negative impact of economic growth on the emissions increases due to the increase in tourism activity. Between 1994 and 2014 for OECD countries, Balsalobre-Lorente et al. (2020) revealed an inverse U-shaped relationship between emissions and international tourism expenditures and between emissions and globalization index. It is also among the results that by globalization, tourism's negative impact on emissions declines. For Southeast Asia over 1979-2010, Sherafatian-Jahromi et al. (2017) found evidence of inverted U shaped relation between carbon emissions and tourist arrivals in the long run. All the above studies proved the validity of EKC hypothesis except Dogan et al. (2017), Gao and Zhang (2019), Zhang and Liu (2019), Zhang and Gao (2016) for central China, Azam et al. (2018) for Thailand and Singapore, Sghaier et al. (2019) for Tunisia, Ahmad et al. (2018), Naradda Gamage et al. (2017), Gamage et al. (2017) and Ahmad et al. (2019) for the Philippines.

For G20 countries, there are various studies which analyze the factors affecting CO_2 emissions. In the EKC model, Qiao, Zheng, Jiang, and Dong (2019) showed the EKC hypothesis's validity considering the impacts of agriculture and renewable energy on CO_2 emissions over 1990-2014. Considering the EKC literature, to authors' knowledge, no studies examining the effect of tourism on CO_2 emissions have been found for this country group. To the authors' knowledge, tourism's impact has not been considered so far for G20 countries. Therefore this study aims to contribute to the literature by considering the tourism and travel sector's effect.

EMPIRICAL MODEL AND METHODOLOGY

This study employs panel data techniques to examine the effect of tourism development on CO_2 emissions for G20 countries over 1995-2014. Using panel data improves the efficacy of estimates for cases where data are not available for extended periods. There are many factors affecting emissions, for instance, growth in production, consumption and population, type of infrastructure and technological lock-in (Sarkodie & Strezov, 2019). Similar to models employed by Porto and Ciaschi (2020), Ehigiamusoe (2020), Balsalobre-Lorente et al. (2020) and Sherafatian-Jahromi et al. (2017), this study performs the analysis in the context of the model shown in equation (1) which further considers non-linear and indirect impacts of tourism as well as heterogeneity among countries by adding squared and interaction terms, and individual fixed effects, respectively;

$$\begin{aligned} \boldsymbol{CO}_{2i,t} = {} & \alpha_i + \beta_1 \boldsymbol{tour}_{i,t} + \beta_2 \boldsymbol{tour}_{i,t}^2 + \beta_3 \boldsymbol{gdp}_{i,t} + \beta_4 \boldsymbol{gdp}_{i,t}^2 + \beta_5 \boldsymbol{energy}_{i,t} + \beta_6 \boldsymbol{capital}_{i,t} \\ & + \beta_7 \boldsymbol{labor}_{i,t} + + \beta_8 \boldsymbol{health}_{i,t} + \beta_9 \boldsymbol{trade}_{i,t} + \beta_{10} \boldsymbol{fdi}_{i,t} + \beta_{11} \boldsymbol{tour}_{i,t} \boldsymbol{gdp}_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{1}$$

Where, i=1,…,20 and t=1995,...,2014 are subscripts for countries and time periods. $\boldsymbol{\mu}_{i,t} \sim iidN\left(0,\sigma^2\right)$ for all country i, year t. αi is a country-specific fixed effect (FE). In equation 1, based on EKC, CO2 emissions per capita (CO2) is explained as a function of the total contribution of the tourism sector to GDP (tour), square of the tour (tour2), per capita GDP (g*dp)*, square of g*dp* (g*dp2*), energy use per capita (energy), gross capital formation (capital), labour force participation rate (labour), health expenditure (health), trade openness (trade), foreign direct investment (f*di)* and the interaction term (t*ourgdp)*. Per capita CO2 emissions, GDP and energy use are transformed using natural logarithm; therefore, after estimations, coefficients associated with g*dp* and energy give respective elasticity estimates. These equations are estimated by OLS under various assumptions and restrictions (i.e., homogeneity). However, in the case of violation of assumptions (heteroscedasticity and autocorrelation) and invalidity of restrictions (heterogeneity of countries), analysis is performed by employing Feasible Generalized Least Square Dummy Variable (FGLSDV) estimation method.

Based on the tourism-led growth hypothesis, and due to the positive contribution of tourism to economic growth, tourism can cause higher energy usage and higher emission levels. Similar to Ehigiamusoe (2020), to test the indirect effect of tourism on emissions through economic growth, equation (1) an interaction term was added, which is obtained by multiplying tour by 'gdp'. Income increase can lead to emission increase or decrease, which can also be affected by tourism-related activities. Tourism can contribute adversely or favourably to the impact of income increase on emissions. Therefore, the sign of $\boldsymbol{\beta}1_1$ is an ambiguous p*riori.* On the other hand, as in the EKC hypothesis, tourism activities itself also may increase emissions up to a certain threshold level of tourism development ($\boldsymbol{\beta}1>0$), and after this level may lead to a reduction in emissions ($\boldsymbol{\beta}2<0$) as a result of eco-tourism, sustainable tourism development, utilization and efficient management of clean energy technologies or vice versa, i.e., although tourism may have positive effects on the environment at low levels of tourism development ($\boldsymbol{\beta}1<0$), at high levels by increasing energy consumption it can increase emissions ($\boldsymbol{\beta}2>0$) (Ehigiamusoe, 2020). In order to consider the non-linear effect of tour, *squ*are of tour *was* added beside itself.

Due to the EKC hypothesis, sign expectations for the coefficient of gdp *is* positive ($\boldsymbol{\beta}3>0$) and for gdp2 *is* negative ($\boldsymbol{\beta}4<0$) (Papavasileiou & Tzouvanas, 2020). In other words, according to the EKC hypothesis, at first, developing countries give more importance to growth compared to environmental conservation and utilize fossil fuels for this purpose. However, after some level of GDP, by considering environmental factors, they prefer to shift to clean energy sources such as renewable energy due to increases in institutional quality, environmental awareness and diffusion of technology and innovation (Sarkodie & Strezov, 2019). Therefore, based on countries' development level, CO2 emissions increase as income increases at low-income levels, but after some threshold level of income, emissions decrease as income increases (Papavasileiou & Tzouvanas, 2020). Then, by taking CO2 emissions as a function of income, an inverted U shape curve called EKC can be obtained (Paramati et al., 2018). For a literature survey and meta-analysis of studies based on the EKC hypothesis, one can refer to two recent studies by

Sarkodie and Strezov (2019) and Shahbaz and Sinha (2019). Moreover, as energy use, especially based on fossil fuels is expected to increase CO2 emissions (Balsalobre-Lorente et al., 2020; Naradda Gamage et al., 2017; Porto & Ciaschi, 2020), one expects $\beta 5>0$.

Moreover, capital may lead to emission increase ($\beta 6>0$) if investments are directed towards polluting technologies and areas (Porto & Ciaschi, 2020), but vice versa ($\beta 6<0$) for green investments. Labor may cause emission increase ($\beta 7>0$) if as a result of economic growth more fossil fuel-based energy is used. But if labor can substitute capital and energy, emissions may decline ($\beta 7<0$). health is expected to increase emissions ($\beta 8>0$) because higher emissions may be related to its adverse effect on health which increases health expenditures as discussed by Porto and Ciaschi (2020). But, higher health expenditures may lead to lower emissions ($\beta 8<0$) because higher expenditures can be a sign for the country's social development level, the importance given by the countries to the health of their citizens and social sustainability. trade can increase environmental quality ($\beta 9<0$) as a result of energy efficient and renewable energy technology spillover (Balsalobre-Lorente et al., 2020) called as technique effect (Dogan et al., 2017) or may lead to emission increase ($\beta 9>0$) because of scale effect (de Vita et al., 2015), production shift to pollution intensive industries based on country's competitive advantage, i.e. composition effect (Dogan et al., 2017), fossil fuel-based transportation and also absence of stringent environmental regulations (Sarkodie & Strezov, 2019). Based on PHH, because of comparative advantage created through cost reductions due to weak environmental regulations, fdi can cause high energy usage which may be based on fossil fuels and thus increase emissions ($\beta 10>0$) (Anser et al., 2020; Sarkodie & Strezov, 2019; Udemba, Magazzino, & Bekun, 2020). But, inversely, because of energy saving or environmentally friendly technology transfer, it may decrease total or fossil fuel-based energy usage (Sarkodie & Strezov, 2019). In turn, fdi may decrease emissions which is called as Pollution Halo Hypothesis ($\beta 10<0$).

In the analysis, general to specific modelling procedure was followed. Based on the general model shown in equation (1), different hypotheses were tested for the effect of tourism on emissions, which are non-linear versus linear effects (H0: $\beta 2=0$) and direct versus indirect effects (H0: $\beta 11=0$). After obtaining a simplified model, N-shaped or inverted N-shaped curve hypotheses were tested by including a cubic term for gdp (gdp3). Lastly, to verify the inverse U shape relation, the author employed the U-test algorithm proposed by Lind and Mehlum (2010). The interpretation is based on the final model obtained after these hypothesis tests.

Data

This study employs annual balanced panel data on G20 countries over 1995-2014. The time period under investigation is restricted by data unavailability after 2014 for CO2 emissions. This was also mentioned in recent studies such as Akadiri et al. (2019) and Eyuboglu and Uzar (2020). Table 1 shows the data employed and data sources.

Table 2 illustrates the summary statistics for the EKC Model (N=20, T=20). The coefficient of variation shows that there is larger variability for fdi and CO2 over time and across countries compared to other variables. The highest values for fdi and CO2 are recorded by Germany in 2000 and by the United States in 2000, respectively, whereas, the lowest values were realized in Australia in the year 2005 for fdi and in India in the year 1995 for CO2. Moreover, tour is the highest for Saudi Arabia in 1999, but the lowest for Canada in 1997. Lastly, the United States records the highest real GDP per capita in 2014 and the lowest real GDP per capita was realized in India in the year 1995.

Table 1. Data Sources for EKC Model

Series	Code	Source
CO2 emissions (metric tons per capita)	EN.ATM.CO2E.PC	The World Bank, WDI Database
Energy use (kg of oil equivalent per capita)	EG.USE.PCAP.KG.OE	
GDP per capita, PPP (constant 2011 international $)	NY.GDP.PCAP.PP.KD	
Foreign direct investment, net inflows (% of GDP)	BX.KLT.DINV.WD.GD.ZS	
Gross capital formation (% of GDP)	NE.GDI.TOTL.ZS	
Health expenditure, total (% of GDP)	SH.XPD.TOTL.ZS	
Labor force participation rate, total (% of total population ages 15-64) (modeled ILO estimate)	SL.TLF.ACTI.ZS	
Trade (% of GDP)	NE.TRD.GNFS.ZS	
Total contribution of tourism and travel sector to GDP, (% of GDP)		WTTC Data Gateway

Table 2. Summary Statistics for EKC Model (N=20, T=20)

	Mean	Standard Deviation	Coefficient of Variation*	Minimum	Maximum
CO_2	1.870513	0.793687	0.424315	-0.16848	3.004632
tour	9.820313	2.834458	0.288632	4.71065	19.2625
$tour^2$	104.4526	58.998	0.56483	22.19022	371.0439
gdp	9.928266	0.763654	0.076917	7.619135	10.85574
gdp^2	19.85653	1.527308	0.076917	15.23827	21.71149
energy	7.899361	0.759156	0.096103	5.957057	9.040877
capital	23.90695	6.558336	0.274328	10.6764	47.6859
labor	67.74363	7.935175	0.117135	48.491	83.963
health	7.435729	2.959301	0.397984	1.9253	17.1408
trade	51.04266	18.27653	0.358064	15.63559	110.0001
fdi	2.20709	1.936213	0.87727	-3.61882	12.71756
$tour \times gdp$	97.55706	29.38931	0.301253	49.07124	204.9294
*Coefficient of variation is calculated by the division of the standard deviation to the mean.					

In order to perform comparative analysis across countries, the average values shown in Table 3 were calculated for each variable by taking averages over time. This study's primary focus is to analyze the tourism and travel sector's effect on CO2 emissions. This comparative analysis also concentrates on the differences in these variables across countries. The table shows that over 1995-2014, on average, CO2,

Table 3. Time Averages of selected variables in EKC Model, 1995-2014

Country	CO_2	tour	gdp	energy	capital	labor	health	trade	fdi
Argentina	1.411	11.223	9.688	7.463	17.442	68.437	7.305	31.587	2.534
Australia	2.835	12.716	10.535	8.629	26.638	75.163	8.443	40.943	3.013
Brazil	0.667	9.109	9.445	7.076	19.108	68.864	7.598	**23.585**	2.959
Canada	2.795	5.913	10.561	*8.993*	22.130	77.063	9.708	69.721	3.228
China	1.452	8.536	8.641	7.187	*41.346*	*79.756*	4.646	46.689	3.770
EU	2.047	10.934	10.368	8.144	21.372	68.845	9.149	69.900	4.068
France	1.745	9.912	10.476	8.312	21.878	69.309	10.563	53.493	2.131
Germany	2.281	11.787	10.553	8.306	20.917	73.995	10.480	67.903	2.155
India	**0.133**	11.628	**8.070**	**6.156**	33.738	58.297	4.292	38.146	1.345
Indonesia	0.434	6.589	8.868	6.648	25.964	68.162	**2.504**	57.888	1.100
Italy	1.992	11.285	10.491	7.981	20.098	61.335	8.431	49.769	0.994
Japan	2.251	8.425	10.460	8.265	25.329	73.227	8.319	25.440	**0.170**
South Korea	2.296	6.253	10.102	8.366	32.382	65.350	5.408	*77.522*	1.047
Mexico	1.390	*14.731*	9.617	7.332	21.707	63.244	5.693	55.489	2.625
Russia	2.421	**5.596**	9.798	8.418	21.507	71.419	6.118	54.220	2.101
Saudi Arabia	2.727	11.315	10.711	8.595	23.381	52.454	3.709	75.736	2.145
South Africa	2.190	8.453	9.289	7.871	18.927	58.211	8.274	55.622	1.605
Turkey	1.287	11.816	9.675	7.161	25.691	**52.038**	4.973	47.406	1.305
United Kingdom	2.133	12.072	10.457	8.154	**17.274**	75.233	8.065	53.998	*4.142*
USA	*2.925*	8.113	*10.762*	8.930	21.310	74.470	*15.038*	25.794	1.704
Average	1.871	9.820	9.928	7.899	23.907	67.744	7.436	51.043	2.207

gdp and health are the highest in the US. Mexico recorded the biggest tour, while Russia experienced the lowest. India has the lowest average CO2, gdp and energy.

Figure 1 illustrates the contribution of Tourism and Travel Sector to GDP (% of GDP) and CO2 emissions per capita for each G20 countries over 1995-2014. Each country has its own specific pattern. However, major developed countries (such as Australia, Canada, European Union, France, Germany, Italy, the United Kingdom, and the United States of America) seem to decrease their CO2 emissions per capita. On the other hand, CO2 emissions per capita continue to increase in China, Saudi Arabia, and South Korea. There seems to be a constant pattern for Japan and South Africa.

Moreover, one cannot see a clear relationship between CO2 emissions per capita and tourism. Therefore, one needs to analyze their relation in the context of an econometric model. Before estimation of models, the presence of collinearity was checked for each model.

Table 4 presents pairwise correlations among variables showing that although there are strong relations between CO2 and all other variables, there is no evidence of collinearity among explanatory variables. The variance inflation factor was also calculated as 2.83, which implies the absence of collinearity problem among variables after omitting squared and interacting terms in equation (1).

Figure 1. Contribution of Tourism and Travel Sector to GDP (% of GDP) and CO_2 emissions per capita for G20 Countries
Source: *Developed for this study, based on World Bank WDI data using Stata 11.2*

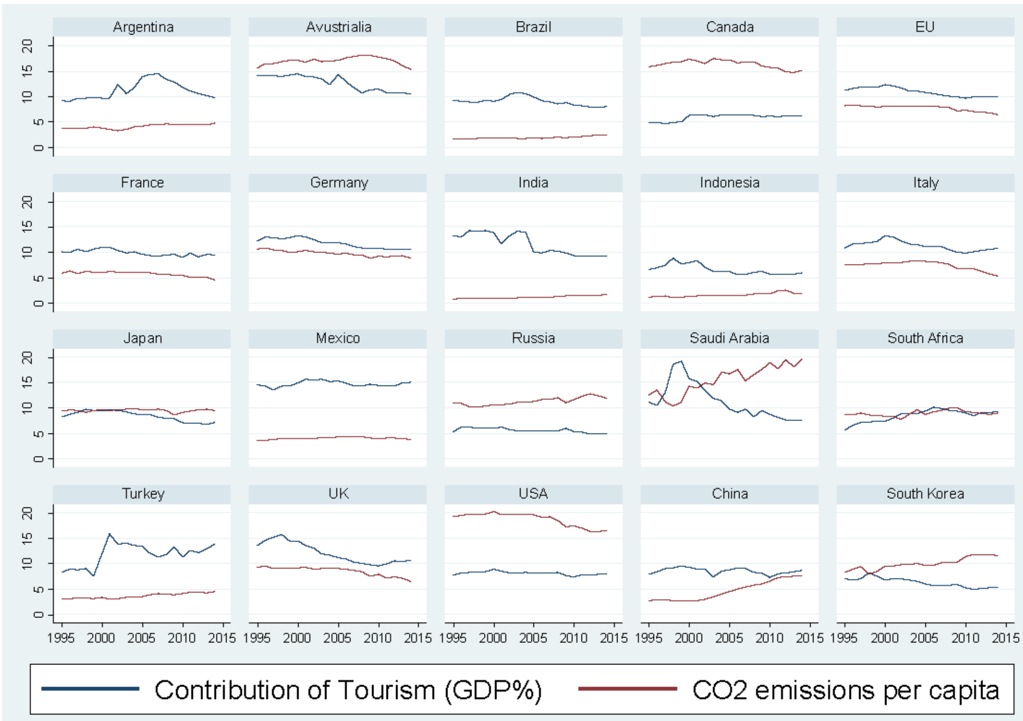

Table 4. Pairwise Correlations for EKC Model

	CO_2	tour	tour²	gdp	gdp²	energy	capital	labor	health	trade	fdi	tour ×gdp
CO_2	1.00											
tour	-0.15	1.00										
tour²	-0.13	0.99	1.00									
gdp	0.82	0.03	0.02	1.00								
gdp²	0.82	0.03	0.03	1.00	1.00							
energy	0.96	-0.20	-0.18	0.88	0.89	1.00						
capital	-0.17	-0.18	-0.18	-0.39	-0.38	-0.26	1.00					
labor	0.26	-0.29	-0.29	0.19	0.20	0.33	0.05	1.00				
health	0.52	-0.06	-0.10	0.61	0.62	0.60	-0.40	0.43	1.00			
trade	0.27	-0.14	-0.11	0.23	0.23	0.28	0.04	-0.15	-0.16	1.00		
fdi	0.09	0.06	0.04	0.07	0.07	0.09	0.07	0.24	0.07	0.12	1.00	
tour×gdp	0.07	0.96	0.95	0.29	0.29	0.04	-0.28	-0.22	0.09	-0.07	0.08	1.00

Empirical Results

Table 5 shows estimation results for tourism induced EKC model. Driscoll and Kraay (1998) standard errors are reported in parentheses for the correction of possible model specification errors, i.e., heteroscedasticity, autocorrelation, and cross-sectional dependence in (1), (2) and (3).

LMρ statistics test for the first-order autocorrelation in the residuals; LMρ is asymptotically distributed as chi-square with one degree of freedom (df) under the assumption of no autocorrelation. LRH is heteroscedasticity test statistic and has asymptotic chi-square null distribution with 20 degrees of freedom. FGLSDV estimation with individual fixed effects (FE) allows for heteroskedastic error structure. In FGLSDV estimation, panel specific AR (1) autocorrelation coefficients are estimated for each country. Country-specific FE's are statistically significant, and there is evidence of autocorrelation and heteroscedasticity in the residuals obtained from within estimation. The inference is therefore based on the results obtained from FGLSDV estimation. However, as results indicate that there is no evidence of non-linear and indirect effects of tourism, it was repeated without considering them. The interpretation was based on the results shown in column (5) of Table 5.6

The results show that tourism and travel sector have a statistically significant negative effect on CO_2 emissions. This result is expected and validates green tourism hypothesis (Ben Jebli, Ben Youssef, & Apergis, 2019). As the tourism value chain activities in GDP increase, countries most likely follow various policies for the mitigation of emissions and emphasize environmental sustainability (Bojanic & Warnick, 2020). Moreso, this result can be due to international tourists' environmental awareness, which may lead to sustainability in consumption and production (Shaheen et al., 2019). This finding confirms the results of Bella (2018), Akadiri et al. (2019), Kocak et al. (2020), Paramati et al. (2018), Porto and Ciaschi (2020) for high CO_2 emission levels, Naradda Gamage et al. (2017), Shaheen et al. (2019), Ben Jebli et al. (2019) and Ehigiamusoe (2020), among many others. As Porto and Ciaschi (2020) discussed, if revenues obtained from tourism-related activities can be directed towards green investments, then increasing these activities can prevent environmental degradation and lead to better environmental management and preservation.

In addition, the results validate the EKC hypothesis such that GDP and gdp^2 have statistically significant positive and negative effects on CO_2, respectively. Real per capita income increases CO_2 emissions per capita up to a certain level of per capita real GDP found as 4587.645 (constant 2011 international dollar, PPP). After this level, findings signify a negative relationship between them. Many previous studies also showed the validity of the EKC hypothesis, such as Bella (2018), Akadiri et al. (2019), Shaheen et al. (2019), Porto and Ciaschi (2020), Balsalobre-Lorente et al. (2020), Anser et al. (2020) and Papavasileiou and Tzouvanas (2020). Energy, capital and FDI affect CO_2 positively and statistically significant. Previously, in contrast to this study's findings, Porto and Ciaschi (2020) showed a positive effect of health expenditures on emissions and the insignificant impact of gross capital formation. Energy was found to increase emissions by also Akadiri et al. (2019), Shaheen et al. (2019), Porto and Ciaschi (2020), Naradda Gamage et al. (2017), Ng et al. (2016), Balsalobre-Lorente et al. (2020), Ehigiamusoe (2020), Eluwole, Saint Akadiri, Alola, and Etokakpan (2020), and Khan et al. (2020). As the share of fossil fuels in these country groups' energy consumption is 80.90% on average between 1995-2014, higher energy usage can increase emissions as expected. Moreover, Shaheen et al. (2019), Balsalobre-Lorente et al. (2020), Anser et al. (2020), Ng et al. (2016) and Khan et al. (2020) showed that foreign direct investments increase emissions which support results validating PHH. Findings show that labour and trade significantly decrease emissions. In line with results, Dogan et al. (2017) and after some level of trade, Balsalobre-Lorente et al. (2020) found a negative effect of trade on emissions. As labour force participation increases, emissions decline. This result can be taken as a sign showing importance of social sustainability for environmental sustainability (Shahbaz & Sinha, 2019).

Table 5. Pooled and Fixed Effects Estimations of EKC Model

CO_2	(1)	(2)	(3)	(4)	(5)[1]
tour	-0.060652	0.016452	0.013910	-0.01202	-0.00462***
	(0.048281)	(0.034388)	(0.035269)	(0.017264)	(0.001254)
tour²	-0.002923**	0.000065	0.000376	-0.00022	
	(0.001047)	(0.000846)	(0.000783)	(0.000289)	
gdp	0.067602	0.972474***	1.025115***	0.437157**	0.510926***
	(0.187509)	(0.312417)	(0.271673)	(0.178422)	(0.148927)
gdp²	-0.026190**	-0.050877***	-0.053923***	-0.0261***	-0.0303***
	(0.008617)	(0.014510)	(0.011701)	(0.00902)	(0.007668)
energy	1.354576***	1.031375***	1.027554***	1.089145***	1.100999***
	(0.039439)	(0.065952)	(0.069205)	(0.025776)	(0.024533)
capital	0.009044***	0.003649***	0.003865***	0.002835***	0.003291***
	(0.000824)	(0.001151)	(0.001325)	(0.000706)	(0.00062)
labor	-0.007498***	-0.002703	-0.003111	-0.00258**	-0.00196*
	(0.001433)	(0.002074)	(0.002605)	(0.001247)	(0.001129)
health	-0.007303	-0.003127	-0.004293	-0.00224	
	(0.004532)	(0.003740)	(0.003461)	(0.002477)	
trade	-0.001007***	-0.001303***	-0.001548***	-0.0004*	-0.00036*
	(0.000208)	(0.000277)	(0.000510)	(0.000217)	(0.000209)
fdi	0.000405	0.002493*	0.001644	0.000903*	0.000915**
	(0.003417)	(0.001288)	(0.001363)	(0.000469)	(0.000463)
tour × gdp	0.015206***	-0.002569	-0.003209	0.001202	
	(0.003456)	(0.003278)	(0.003322)	(0.001704)	
Constant	-7.090090***	-10.624641***	-10.735948***	-8.31839***	-8.77523***
	(1.078993)	(1.321068)	(1.261223)	(0.904828)	(0.70971)
R^2	0.9569	0.8967	0.9015	-	-
LM_ρ	341.13641***	149.9585***	158.78452***	-	-
LR_H	629.84847***	441.34094***	176.58738***	-	-
Individual FE		222.88705***		-	-
Time-period FE			0.89246394	-	-
Joint FE test			8254.9915***	-	-
Pesaran's CD test	6.97***	0.423	-0.692	-	-

Notes: *, **, *** show statistical significance of test statistic at 10%, 5% and 1%. The author does not present estimation results related to coefficients on individual and time-period fixed effects to save space.
Pooled OLS; (2) Individual FE; (3) Individual and Time period FE; (4) FGLSDV; (5) FGLSDV.
[1]The u-test algorithm was applied and based on t-value obtained as 1.39 with P>|t| = .0821, the H_0 of Monotone or U shape can be rejected against H_a of inverse U shape.

A 1% increase in energy use per capita, gross capital formation (% of GDP) and foreign direct investment inflow (% of GDP) increase CO_2 emissions per capita by 1.101%, 0.07869%7 and 0.002019%[7], respectively. A 1% increase in a total contribution of tourism and travel sector (% of GDP), trade openness and labour force participation rate decrease CO_2 emissions per capita by 0.04537%[7], 0.01838%[7], and 0.13278%[7]. Negative and statistically significant estimated intercept indicates that without any changes in the factors, CO_2 emissions decline. Akadiri et al. (2019) also found a similar result. Therefore, G20 countries are shown to implement effective policies in order to decrease their emission level. This can be taken to show their ambition for global warming and climate change mitigation and sustainable development.

In addition, to understand the direction of causality, bivariate Granger causality tests were performed only between CO_2 emissions and all other variables. In Table 6, the results indicate the presence of feedback relations between energy and CO_2 in line with results of Shaheen et al. (2019), Balsalobre-Lorente et al. (2020), Eluwole et al. (2020), Zhang and Liu (2019), and Udemba et al. (2020).

Table 6. Heterogeneous Panel Bivariate Granger Causality Test Results for emissions

	$\bar{W}$	$\bar{Z}$		$\tilde{\bar{Z}}$	
tour $\rightarrow$ ***CO_2***	2.2088	3.8227	(0.2060)	2.6382	(0.2060)
CO_2 $\rightarrow$ ***tour***	1.7849	2.482	(0.5540)	1.5889	(0.5540)
gdp $\rightarrow$ ***CO_2***	4.0528	9.6538**	(0.0370)	7.2017**	(0.0370)
CO_2 $\rightarrow$ ***gdp***	2.0972	3.4697	(0.2700)	2.3619	(0.2700)
energy $\rightarrow$ ***CO_2***	3.2678	7.1713*	(0.0910)	5.2589*	(0.0910)
CO_2 $\rightarrow$ ***energy***	3.8034	8.8651**	(0.0230)	6.5845**	(0.0230)
capital $\rightarrow$ ***CO_2***	1.9421	2.9792	(0.2580)	1.9781	(0.2580)
CO_2 $\rightarrow$ ***capital***	2.314	4.1552	(0.2710)	2.8984	(0.2710)
fdi $\rightarrow$ ***CO_2***	1.18	0.5691	(0.6960)	0.0918	(0.9460)
CO_2 $\rightarrow$ ***fdi***	1.1149	0.3632	(0.8540)	-0.0693	(0.9590)
health $\rightarrow$ ***CO_2***	3.7332	8.6431**	(0.0220)	6.4108**	(0.0220)
CO_2 $\rightarrow$ ***health***	1.9638	3.0478	(0.3830)	2.0317	(0.3830)
trade $\rightarrow$ ***CO_2***	6.2093	16.4734***	(0.0000)	12.5389***	(0.0000)
CO_2 $\rightarrow$ ***trade***	2.6048	5.075	(0.2200)	3.6182	(0.2200)
labor $\rightarrow$ ***CO_2***	4.6895	11.6672***	(0.0020)	8.7775***	(0.0020)
CO_2 $\rightarrow$ ***labor***	10.4381	29.8459***	(0.0000)	23.0046***	(0.0000)
The lag length was based on BIC. Bootstrapped p-values are shown in parentheses to account for cross-sectional dependency. The bootstrap number is 1000. *,**,*** show the statistical significance at 10%, 5% and 1% statistical significance level.					

Energy consumption, which mostly depends on fossil fuels as expected Granger, causes CO_2 emissions and vice versa. Bidirectional causality was also found between labour and CO_2. Furthermore, findings show that there is unidirectional causality from GDP to CO_2 supported by also for example, findings of Qiao et al. (2019) for developed G20 countries in the short run, Udemba et al. (2020), Kocak et al.

(2020), Ehigiamusoe (2020), Balsalobre-Lorente et al. (2020) and Anser et al. (2020) among many others. Other findings are one-way causalities from health to CO_2 and from trade to $CO_{2,}$ which were also revealed by Qureshi et al. (2017). Causality from trade to CO_2 was also indicated by Dogan et al. (2017). Policies related to economic growth, energy market, health sector, international trade and labour market may affect environmental quality. Moreover, in return, environmental and climate change-related policies may also impact the energy sector and labour markets.

CONCLUSION

If appropriately supported with other industries, tourism has the potential to be a key sector for economic growth and sustainable development (Ahmad et al., 2018). However, as already stated by Bojanic and Warnick (2020) and other studies, tourism and travel sector activities can also cause severe environmental degradation because of fossil fuels used in the sector's related activities. Based on the EKC model, this study examined the effect of tourism on CO_2 emissions for G20 countries from 1995-2014 using panel data techniques. Overall, results show that tourism reduces emissions and EKC hypothesis is valid. The favourable effect of tourism on environmental quality may indicate the successful transition of these countries' tourism sector to the low carbon economy.

Furthermore, authors established that energy consumption, investment, and FDI increase emissions, signifying energy and investment induced emissions and the validity of PHH. However, an increase in labour force participation and improvement in foreign trade contributes favourably to environmental quality. This finding related to labour force participation rate shows the importance of social sustainability for environmental sustainability.

RECOMMENDATIONS AND POLICY IMPLICATIONS

Tourism: Climate Change Policy Integration

The tourism sector has been known to have fewer adverse effects compared to other sectors considering its environmental effects. In this respect, increasing G20 member countries' investments in the tourism sector will contribute to their sustainable development. Therefore, it is crucial to focus on green investments, green energy development and qualified business formation by integrating environmental, energy and economic policies to ensure sustainable and inclusive growth in tourism-related policies (Khan et al., 2020). The authors support the notion that tourism policy is integrated into the climate change policy in different dimensions such as growth and competitiveness, regional development and sustainable use of resources. The proven role of public-private partnerships (PPPs) cannot be understated as such partnerships have proved to work in other areas including the management of innovations (Saruchera, 2014; Saruchera & Phiri, 2016) and tourism projects (Wilson, Nielsen, & Buultjens, 2009).

Policy integration across different sectors should also be considered for policy consistency and coherence and better coordination and cooperation among sectors while implementing climate change mitigation and adaptation policies. In the context of the circular economy, the tourism sector can contribute favourably to waste recycling, reuse and disposal as the sector contributes to bio-waste and energy consumption due to its nature. Besides other renewables, bioenergy-based energy systems can be implemented on a large scale. As climate change and global warming are global issues that call for a solution, international cooperation and coordination should be enhanced in all relevant dimensions.

Greening the Tourism Support (Value Chain) Activities

For the transformation of the tourism sector parallel to transition to low carbon economy, investments related to accommodation, transportation, telecommunications, and other tourism activities should be carried out to support environmentally friendly and energy-efficient technologies. All these necessitate carbon management by businesses, tourists' behavioural changes and governments' initiatives related to climate change mitigation and adaptation such as taxes, tradable permits, incentives and campaigns for knowledge and awareness increase.

Sustainable Tourism Incentives and Penalties

Furthermore, the application of penalties may control negative externalities from tourism-related activities by establishing an effective supervision mechanism. In support of preceding studies, this study commends the G20 members that implement such penalties and implores the less strict countries such as South Africa to step us their control measures. On the other hand, there is also a need to incentivize those tourism organisations that take green tourism initiatives such as afforestation, using green financial instruments, and encouraging green energy and tourism projects. Such incentives could be provided through financial and non-financial incentives such as national recognition, green awards, specific tax exemptions, and subsidies.

Moreover, the carbon footprint of tourism-related activities should be measured, and carbon emissions should be reduced by employing *carbon certificate* mechanisms, energy-performance certification schemes, low carbon technologies in transportation, and various projects such as renewable energy projects.

Incorporating Consumers in Sustainable Tourism

Consumers can also support the tourism sector on the demand side to achieve a sustainable structure by preferring corporations that give importance to environmentally friendly technologies and energy efficiency. Thus, it is necessary to increase environmental awareness and transform the corporate structure into one that can support environmentally friendly technologies. It is also essential to take necessary steps to ensure foreign direct capital flow towards this for transfer of environmentally friendly technologies and technical knowledge.

SUSTAINABLE TOURISM IN THE CONTEXT OF GLOBAL TRANSITION

In 2030, the intensity of carbon emissions is expected to decrease due to increasing electrification and fuel efficiency in transportation, and taking necessary steps related to this transformation in transportation is also crucial in combating climate change (World Tourism Organization and International Transport Forum, 2019).

As a policy recommendation, for sustainable tourism, the tourism sector needs transformation based on green investments, green energy development and qualified business formation, which further necessitates integration of environmental, energy, social and economic policies. The transition to sustainable tourism can be managed by the involvement of all the parties involved. In view of sustainable development and inclusive growth, policymakers should focus on various policies related to all the sectors comprehensively, serving sustainable tourism. Moreover, based on responsibility-sharing, necessary steps should be taken by tourists, businesses and law enforcing bodies.

FUTURE RESEARCH DIRECTIONS

In the age of COVID-19 and global warming, the tourism sector needs structural transformation in terms of environmental concerns and health-related issues considering the energy transition and possible spread of pandemic diseases. Although this study focused on the environmental side of the coin, further analysis is needed to consider the health side. Moreover, analyses can be repeated by employing much more recent data (where available) and other countries or country groups. In addition, case studies can be performed by comparing corporations that already transformed their systems in line with the transition to a low carbon economy and did not consider social costs and benefits. These studies can provide better insights into social costs and the benefits of the transition to the low carbon economy. A similar analysis can also be performed for other sectors using different indicators for environmental degradation. Moreover, a decomposition analysis can be conducted to investigate the source of emissions.

REFERENCES

Ahmad, F., Draz, M. U., Su, L. J., Ozturk, I., & Rauf, A. (2018). Tourism and Environmental Pollution: Evidence from the One Belt One Road Provinces of Western China. *Sustainability*, *10*(10), 3250. doi:10.3390u10103520

Ahmad, F., Draz, M. U., Su, L. J., & Rauf, A. (2019). Taking the bad with the good: The nexus between tourism and environmental degradation in the lower middle-income Southeast Asian economies. *Journal of Cleaner Production*, *233*, 1240–1249. doi:10.1016/j.jclepro.2019.06.138

Akadiri, S. S., Akadiri, A. C., & Alola, U. V. (2019). Is there growth impact of tourism? Evidence from selected small island states. *Current Issues in Tourism*, *22*(12), 1480–1498. doi:10.1080/13683500.2017.1381947

Akadiri, S. S., Lasisi, T. T., Uzuner, G., & Akadiri, A. C. (2019). Examining the impact of globalization in the environmental Kuznets curve hypothesis: The case of tourist destination states. *Environmental Science and Pollution Research International*, *26*(12), 12605–12615. doi:10.100711356-019-04722-0 PMID:30852745

Anser, M. K., Yousaf, Z., Nassani, A. A., Abro, M. M. Q., & Zaman, K. (2020). International tourism, social distribution, and environmental Kuznets curve: Evidence from a panel of G-7 countries. *Environmental Science and Pollution Research International*, *27*(3), 2707–2720. doi:10.100711356-019-07196-2 PMID:31836988

Azam, M., Alam, M., & Hafeez, M. H. (2018). Effect of tourism on environmental pollution: Further evidence from Malaysia, Singapore and Thailand. *Journal of Cleaner Production*, *190*(1), 330–338. doi:10.1016/j.jclepro.2018.04.168

Bach, W., & Gössling, S. (1996). Climatical and ecological impacts of air traffic. *Geographische Rundschau*, *48*, 54–59.

Balli, E., Sigeze, C., Manga, M., Birdir, S., & Birdir, K. (2019). The relationship between tourism, CO2 emissions and economic growth: A case of Mediterranean countries. *Asia Pacific Journal of Tourism Research*, *24*(3), 219–232. doi:10.1080/10941665.2018.1557717

Balsalobre-Lorente, D., Driha, O. M., Shahbaz, M., & Sinha, A. (2020). The effects of tourism and globalization over environmental degradation in developed countries. *Environmental Science and Pollution Research International*, *27*(7), 7130–7144. doi:10.100711356-019-07372-4 PMID:31879881

Becken, S., Whittlesea, E., Loehr, J., & Scott, D. (2020). Tourism and climate change: Evaluating the extent of policy integration. *Journal of Sustainable Tourism*, *28*(10), 1603–1624. doi:10.1080/09669582.2020.1745217

Bella, G. (2018). Estimating the tourism induced environmental Kuznets curve in France. *Journal of Sustainable Tourism*, *26*(12), 2043–2052. doi:10.1080/09669582.2018.1529768

Ben Jebli, M., Ben Youssef, S., & Apergis, N. (2019). The dynamic linkage between renewable energy, tourism, CO2 emissions, economic growth, foreign direct investment, and trade. *Latin American Economic Review*, *28*(1), 2. doi:10.118640503-019-0063-7

Bojanic, D. C., & Warnick, R. B. (2020). The Relationship between a Country's Level of Tourism and Environmental Performance. *Journal of Travel Research*, *59*(2), 220–230. doi:10.1177/0047287519827394

Butler, R. W. (2000). Tourism and the environment: A geographical perspective. *Tourism Geographies*, *2*(3), 337–358. doi:10.1080/14616680050082553

Chengcai, T., Qianqian, Z., Nana, Q., Yan, S., Shushu, W., & Ling, F. (2017). A review of green development in the tourism industry. *Journal of Resources and Ecology*, *8*(5), 449–459. doi:10.5814/j.issn.1674-764x.2017.05.002

Chitakunye, P., Saruchera, F., Derera, E., & Tarkhar-Lail, A. (2014). Managing Consumer Mythology: The Green Consumption of E10 Fuel. *Mediterranean Journal of Social Sciences*, *5*(20), 1098–1098. doi:10.5901/mjss.2014.v5n20p1098

Chitakunye, P., Saruchera, F., Phiri, M., Takhar-Lail, A., & Derera, E. (2014). Consumer Misinformation: the Anti-Consumption of Green Products. *ACR North American Advances*. Retrieved from https://www.researchgate.net/profile/Fanny_Saruchera/publication/329029549_Consumer_Misinformation_the_Anti-Consumption_of_Green_Products/links/5dc990ef299bf1a47b2facef/Consumer-Misinformation-the-Anti-Consumption-of-Green-Products.pdf

de Vita, G., Katircioglu, S., Altinay, L., Fethi, S., & Mercan, M. (2015). Revisiting the environmental Kuznets curve hypothesis in a tourism development context. *Environmental Science and Pollution Research International*, *22*(21), 16652–16663. doi:10.100711356-015-4861-4 PMID:26081781

Dogan, E., Seker, F., & Bulbul, S. (2017). Investigating the impacts of energy consumption, real GDP, tourism and trade on CO2 emissions by accounting for cross-sectional dependence: A panel study of OECD countries. *Current Issues in Tourism*, *20*(16), 1701–1719. doi:10.1080/13683500.2015.1119103

Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics*, *80*(4), 549–560. doi:10.1162/003465398557825

Ehigiamusoe, K. U. (2020). Tourism, growth and environment: Analysis of non-linear and moderating effects. *Journal of Sustainable Tourism*, *28*(8), 1174–1192. doi:10.1080/09669582.2020.1729164

Eluwole, K. K., Saint Akadiri, S., Alola, A. A., & Etokakpan, M. U. (2020). Does the interaction between growth determinants a drive for global environmental sustainability? Evidence from world top 10 pollutant emissions countries. *The Science of the Total Environment*, *705*(1), 135972. doi:10.1016/j.scitotenv.2019.135972 PMID:31841901

Eyuboglu, K., & Uzar, U. (2020). The impact of tourism on CO2 emission in Turkey. *Current Issues in Tourism*, *23*(13), 1631–1645. doi:10.1080/13683500.2019.1636006

Font, X., & Tribe, J. (2001). Promoting green tourism: The future of environmental awards. *International Journal of Tourism Research*, *3*(1), 9–21. doi:10.1002/1522-1970(200101/02)3:1<9::AID-JTR244>3.0.CO;2-Q

Gamage, S. K. N., & Kuruppuge, R. H. (2017). Energy consumption, tourism development, and environmental degradation in Sri Lanka. *Energy Sources. Part B, Economics, Planning, and Policy*, *12*(10), 910–916. doi:10.1080/15567249.2017.1324533

Gao, J., Xu, W., & Zhang, L. (2019). Tourism, economic growth, and tourism-induced EKC hypothesis: evidence from the Mediterranean region. *Empirical Economics*, 1-23.

Gao, J., & Zhang, L. (2019). Exploring the dynamic linkages between tourism growth and environmental pollution: New evidence from the Mediterranean countries. *Current Issues in Tourism*, *24*(1), 1–17. doi:10.1080/13683500.2019.1688767

Gavrilović, Z., & Maksimović, M. (2018). Green innovations in the tourism sector. *Strategic Management*, *23*(1), 36–42. doi:10.5937/StraMan1801036G

Gossling, S., & Peeters, P. (2015). Assessing tourism's global environmental impact 1900-2050. *Journal of Sustainable Tourism*, *23*(5), 639–659. doi:10.1080/09669582.2015.1008500

Grossman, G. M., & Krueger, A. B. (1991). *Environmental Impacts of a North American Free Trade Agreement.* National Bureau of Economic Research Working Paper Series, No. 3914. doi:10.3386/w3914

Hoefnagel, S. J., & Bode, A. U. (2001). Achievements and Limitations of International Environmental Regimes and Institutions in Positive Dispute Prevention: UNEP's Role. In *Responding to Environmental Conflicts: Implications for Theory and Practice* (pp. 283–308). Springer. doi:10.1007/978-94-010-0395-7_18

Holtz-Eakin, D., & Selden, T. M. (1995). Stoking the fires? CO2 emissions and economic growth. *Journal of Public Economics*, *57*(1), 85–101. doi:10.1016/0047-2727(94)01449-X

Jones, C., & Munday, M. (2007). Exploring the Environmental Consequences of Tourism: A Satellite Account Approach. *Journal of Travel Research*, *46*(2), 164–172. doi:10.1177/0047287507299592

Karakaya, E., & Sofuoğlu, E. (2015). *İklim Değişikliği Müzakerelerine Bir Bakış: 2015 Paris İklim Zirvesi*. Paper presented at the International Symposium on Eurasia Energy Issues, İzmir, Turkey.

Katircioglu, S. T. (2014). Testing the tourism-induced EKC hypothesis: The case of Singapore. *Economic Modelling*, *41*(1), 383–391. doi:10.1016/j.econmod.2014.05.028

Khan, A., Bibi, S., Ardito, L., Lyu, J., Hayat, H., & Arif, A. M. (2020). Revisiting the dynamics of tourism, economic growth, and Environmental Pollutants in the Emerging economies—Sustainable tourism Policy implications. *Sustainability*, *12*(6), 2533. doi:10.3390u12062533

Khattak, D., & Wang, Z. (2018). Dynamic relationship between tourism, economic growth, and environmental quality. *Journal of Sustainable Tourism*, *26*(11), 1928–1943. doi:10.1080/09669582.2018.1526293

Kitamura, Y., Ichisugi, Y., Karkour, S., & Itsubo, N. (2020). Carbon footprint evaluation based on tourist consumption toward sustainable tourism in Japan. *Sustainability*, *12*(6), 2219. doi:10.3390u12062219

Koçak, E., Ulucak, R., & Ulucak, Z. Ş. (2020). The impact of tourism developments on CO2 emissions: An advanced panel data estimation. *Tourism Management Perspectives*, *33*, 100611. doi:10.1016/j.tmp.2019.100611

Kuznets, S. (1955). Economic Growth and Income Inequality. *The American Economic Review*, *45*(1), 1–28.

Lee, J. W., & Brahmasrene, T. (2013). Investigating the influence of tourism on economic growth and carbon emissions: Evidence from panel analysis of the European Union. *Tourism Management*, *38*(1), 69–76. doi:10.1016/j.tourman.2013.02.016

Leitaoa, N. C., & Shahbaz, M. (2016). Economic Growth, Tourism Arrivals and Climate Change. [BEE]. *Bulletin of Energy Economics*, *4*(1), 35–43.

Lenzen, M., Sun, Y. Y., Faturay, F., Ting, Y. P., Geschke, A., & Malik, A. (2018). The carbon footprint of global tourism. *Nature Climate Change*, *8*(6), 522–528. doi:10.103841558-018-0141-x

Lind, J. T., & Mehlum, H. (2010). With or Without U? The Appropriate Test for a U-Shaped Relationship*. *Oxford Bulletin of Economics and Statistics*, *72*(1), 109–118. doi:10.1111/j.1468-0084.2009.00569.x

Liu, Y. P., Kumail, T., Ali, W., & Sadiq, F. (2019). The dynamic relationship between CO2 emission, international tourism and energy consumption in Pakistan: A cointegration approach. *Tourism Review*, *74*(4), 761–779. doi:10.1108/TR-01-2019-0006

Luo, F., Moyle, B. D., Moyle, C. L. J., Zhong, Y. D., & Shi, S. Y. (2020). Drivers of carbon emissions in China's tourism industry. *Journal of Sustainable Tourism*, *28*(5), 747–770. doi:10.1080/09669582.2019.1705315

Mardani, A., Streimikiene, D., Cavallaro, F., Loganathan, N., & Khoshnoudi, M. (2019). Carbon dioxide (CO2) emissions and economic growth: A systematic review of two decades of research from 1995 to 2017. *The Science of the Total Environment*, *649*, 31–49. doi:10.1016/j.scitotenv.2018.08.229 PMID:30170214

Mishra, S., Sinha, A., Sharif, A., & Suki, N. M. (2020). Dynamic linkages between tourism, transportation, growth and carbon emission in the USA: Evidence from partial and multiple wavelet coherence. *Current Issues in Tourism*, *23*(21), 2733–2755. doi:10.1080/13683500.2019.1667965

Naradda Gamage, S. K., Hewa Kuruppuge, R., & Haq, I. (2017). Energy consumption, tourism development, and environmental degradation in Sri Lanka. *Energy Sources. Part B, Economics, Planning, and Policy*, *12*(10), 910–916. doi:10.1080/15567249.2017.1324533

NASA. (2020). *Overview: Weather, Global Warming and Climate Change*. Retrieved January 21, 2021 from https://climate.nasa.gov/resources/global-warming-vs-climate-change/

Nepal, R., al Irsyad, M. I., & Nepal, S. K. (2019). Tourist arrivals, energy consumption and pollutant emissions in a developing economy-implications for sustainable tourism. *Tourism Management*, *72*, 145–154. doi:10.1016/j.tourman.2018.08.025

Ng, T. H., Lye, C. T., & Lim, Y. S. (2016). A decomposition analysis of CO2 emissions: Evidence from Malaysia's tourism industry. *International Journal of Sustainable Development and World Ecology*, *23*(3), 266–277. doi:10.1080/13504509.2015.1117534

OECD-UNEP. (2011). *Climate Change and Tourism Policy in OECD Countries*. OECD Publishing.

Panayotou, T. (1993). *Empirical tests and policy analysis of environmental degradation at different stages of economic development*. ILO World Employment Programme Research Working Papers. Working Papers Technology and Employment Programme International Labour Organization. Retrieved from https://ideas.repec.org/p/ilo/ilowps/992927783402676.html

Papavasileiou, E. F., & Tzouvanas, P. (2020). Tourism Carbon Kuznets-Curve Hypothesis: A Systematic Literature Review and a Paradigm Shift to a Corporation-Performance Perspective. *Journal of Travel Research*, *0*(0), 1–16. doi:10.1177/0047287520915276

Paramati, S. R., Alam, M. S., & Lau, C. K. M. (2018). The effect of tourism investment on tourism development and CO2 emissions: Empirical evidence from the EU nations. *Journal of Sustainable Tourism*, *26*(9), 1587–1607. doi:10.1080/09669582.2018.1489398

Pigram, J. J. (1980). Environmental implications of tourism development. *Annals of Tourism Research*, *7*(4), 554–583. doi:10.1016/0160-7383(80)90049-3

Porto, N., & Ciaschi, M. (2020). Reformulating the tourism-extended environmental Kuznets curve: A quantile regression analysis under environmental legal conditions. *Tourism Economics*, *2020*, 1–24. doi:10.1177/1354816620912556

Qiao, H., Zheng, F., Jiang, H., & Dong, K. (2019). The greenhouse effect of the agriculture-economic growth-renewable energy nexus: Evidence from G20 countries. *The Science of the Total Environment*, *671*, 722–731. doi:10.1016/j.scitotenv.2019.03.336 PMID:30939325

Qureshi, M. I., Hassan, M. A., Hishan, S. S., Rasli, A. M., & Zaman, K. (2017). Dynamic linkages between sustainable tourism, energy, health and wealth: Evidence from top 80 international tourist destination cities in 37 countries. *Journal of Cleaner Production*, *158*, 143–155. doi:10.1016/j.jclepro.2017.05.001

Sarkodie, S. A., & Strezov, V. (2019). A review on Environmental Kuznets Curve hypothesis using bibliometric and meta-analysis. *The Science of the Total Environment*, *649*, 128–145. doi:10.1016/j.scitotenv.2018.08.276 PMID:30172133

Saruchera, F. (2014). *Determinants of commercialization of technological innovations in developing economies: a study of Zimbabwe's research institutes* (Doctoral dissertation). Durban: University of KwaZulu-Natal.

Saruchera, F. (2020). Determinants of effective high-risk cargo logistics at sea ports: A case study. *Journal of Transport and Supply Chain Management*, *14*, 13. doi:10.4102/jtscm.v14i0.488

Saruchera, F., & Asante-Darko, D. (2021). Reverse logistics, organizational culture and firm operational performance: Some empirical evidence. *Business Strategy and Development*, *4*(1). Advance online publication. doi:10.1002/bsd2.161

Saruchera, F., & Phiri, M. A. (2016). Technological Innovations Performance And Public-Private-partnerships. *Corporate Ownership & Control*, 549-557. Retrieved from http://www.virtusinterpress.org/IMG/pdf/COC__Volume_13_Issue_4_Summer_2016_Continued4_.pdf#page=23

Sghaier, A., Guizani, A., Ben Jabeur, S., & Nurunnabi, M. (2019). Tourism development, energy consumption and environmental quality in Tunisia, Egypt and Morocco: A trivariate analysis. *GeoJournal*, *84*(3), 593–609. doi:10.100710708-018-9878-z

Shahbaz, M., & Sinha, A. (2019). Environmental Kuznets curve for CO2 emissions: A literature survey. *Journal of Economic Studies (Glasgow, Scotland)*, *46*(1), 106–168. doi:10.1108/JES-09-2017-0249

Shaheen, K., Zaman, K., Batool, R., Khurshid, M. A., Aamir, A., Shoukry, A. M., Sharkawy, M. A., Aldeek, F., Khader, J., & Gani, S. (2019). Dynamic linkages between tourism, energy, environment, and economic growth: Evidence from top 10 tourism-induced countries. *Environmental Science and Pollution Research International*, *26*(30), 31273–31283. doi:10.100711356-019-06252-1 PMID:31468352

Shakouri, B., Khoshnevis Yazdi, S., & Ghorchebigi, E. (2017). Does tourism development promote CO2 emissions? *Anatolia*, *28*(3), 444–452. doi:10.1080/13032917.2017.1335648

Sherafatian-Jahromi, R., Othman, M. S., Law, S. H., & Ismail, N. W. (2017). Tourism and CO2 emissions nexus in Southeast Asia: New evidence from panel estimation. *Environment, Development and Sustainability*, *19*(4), 1407–1423. doi:10.100710668-016-9811-x

Sönmez, N. (1995). Ortak Geleceğimiz Stockholm 1972-Rio 1992 ve Sonrası. *Yeni Türkiye Dergisi*, *1*(5), 193–209.

Tisdell, C. (1987). Tourism, the Environment and Profit. *Economic Analysis and Policy*, *17*(1), 13–30. doi:10.1016/S0313-5926(87)50009-1

Trenberth, K. E., Jones, P. D., Ambenje, P., Bojariu, R., Easterling, D., Klein Tank, A., & Zhai, P. (2007). Observations: Surface and Atmospheric Climate Change. In S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, & H. L. Miller (Eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

Tureac, C. E., & Anca, T. (2008). Types and Forms of Tourism. *Acta Universitatis Danubius: Oeconomica*, *4*, 92–103.

Udemba, E. N., Magazzino, C., & Bekun, F. V. (2020). Modelling the nexus between pollutant emission, energy consumption, foreign direct investment, and economic growth: New insights from China. *Environmental Science and Pollution Research International*, *27*(15), 17831–17842. doi:10.100711356-020-08180-x PMID:32162224

UNWTO. (2020). *Glossary of Tourism Terms*. Retrieved from https://www.unwto.org/glossary-tourism-terms

Walton, J. K. (2018, November 27). Tourism. In *Encyclopædia Britannica.* Retrieved from https://www.britannica.com/topic/tourism

Wang, M. C., & Wang, C. S. (2018). Tourism, the environment, and energy policies. *Tourism Economics*, *24*(7), 821–838. doi:10.1177/1354816618781458

Warren, B. (2020, April 14). *G20 Performance on Climate Change*. Retrieved from https://www.g20-insights.org/policy_briefs/g20-performance-japan-climate-change/

Wilson, E., Nielsen, N., & Buultjens, J. (2009). From lessees to partners: Exploring tourism public–private partnerships within the New South Wales national parks and wildlife service. *Journal of Sustainable Tourism*, *17*(2), 269–285. doi:10.1080/09669580802495774

World Tourism Organization and International Transport Forum. (2019). *Transport-related CO2 Emissions of the Tourism Sector – Modelling Results*. Madrid: UNWTO.

Zaman, K., Moemen, M. A.-e., & Islam, T. (2017). Dynamic linkages between tourism transportation expenditures, carbon dioxide emission, energy consumption and growth factors: Evidence from the transition economies. *Current Issues in Tourism*, *20*(16), 1720–1735. doi:10.1080/13683500.2015.1135107

Zaman, K., Shahbaz, M., Loganathan, N., & Raza, S. A. (2016). Tourism development, energy consumption and Environmental Kuznets Curve: Trivariate analysis in the panel of developed and developing countries. *Tourism Management*, *54*, 275–283. doi:10.1016/j.tourman.2015.12.001

Zhang, L., & Gao, J. (2016). Exploring the effects of international tourism on China's economic growth, energy consumption and environmental pollution: Evidence from a regional panel analysis. *Renewable & Sustainable Energy Reviews*, *53*, 225–234. doi:10.1016/j.rser.2015.08.040

Zhang, S., & Liu, X. Y. (2019). The roles of international tourism and renewable energy in environment: New evidence from Asian countries. *Renewable Energy*, *139*, 385–394. doi:10.1016/j.renene.2019.02.046

ADDITIONAL READING

Dasgupta, S., Laplante, B., Wang, H., & Wheeler, D. (2002). Confronting the environmental Kuznets curve. *The Journal of Economic Perspectives*, *16*(1), 147–168. doi:10.1257/0895330027157

Gossling, S., Scott, D., & Hall, C. M. (2018). Global trends in length of stay: Implications for destination management and climate change. *Journal of Sustainable Tourism*, *26*(12), 2087–2101. doi:10.1080/09669582.2018.1529771

Higgins-Desbiolles, F. (2018). Sustainable tourism: Sustaining tourism or something more? *Tourism Management Perspectives*, *25*, 157–160. doi:10.1016/j.tmp.2017.11.017

Higham, J., Cohen, S. A., Cavaliere, C. T., Reis, A., & Finkler, W. (2016). Climate change, tourist air travel and radical emissions reduction. *Journal of Cleaner Production*, *111*, 336–347. doi:10.1016/j.jclepro.2014.10.100

Moutinho, V., Costa, C., & Bento, J. P. C. (2015). The impact of energy efficiency and economic productivity on CO2 emission intensity in Portuguese tourism industries. *Tourism Management Perspectives*, *16*, 217–227. doi:10.1016/j.tmp.2015.07.009

Pan, S.-Y., Gao, M., Kim, H., Shah, K. J., Pei, S.-L., & Chiang, P.-C. (2018). Advances and challenges in sustainable tourism toward a green economy. *The Science of the Total Environment*, *635*, 452–469. doi:10.1016/j.scitotenv.2018.04.134 PMID:29677671

Scott, D., Gossling, S., Hall, C. M., & Peeters, P. (2016). Can tourism be part of the decarbonized global economy? The costs and risks of alternate carbon reduction policy pathways. *Journal of Sustainable Tourism*, *24*(1), 52–72.

Sun, Y.-Y. (2016). Decomposition of tourism greenhouse gas emissions: Revealing the dynamics between tourism economic growth, technological efficiency, and carbon emissions. *Tourism Management*, *55*, 326–336. doi:10.1016/j.tourman.2016.02.014

KEY TERMS AND DEFINITIONS

Climate Change: Long-term change of climatic conditions (such as temperature, precipitation) in a region.

Environmental Kuznets Curve: Curve showing the relationship between environmental quality and income per capita.

G20: Together with the European Union, 19 major developed and emerging countries form the Group of Twenty.

Global Warming: Rise in the average temperature of the Earth as a result of greenhouse gas emissions.

Panel Data: Multidimensional data contains both time series and cross-section dimension and showing a sample of cross-sections over time.

Renewable Energy: Energy obtained from renewable sources which are nondepletable, such as wind, solar and geothermal power.

Sustainable Tourism: Tourism which considers all current and future impacts and meets the expectations of tourists, host countries, environment, and industry.

ENDNOTES

1 These figures were calculated based on data obtained from World Tourism and Travel Council (WTTC) Data Gateway .

2 The shares for different sectors were taken from World Bank (WB), World Development Indicators (WDI) Database.

3 G20 countries are defined as 19 member countries (Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, United States of America) and the European Union (http://g20.org.tr/about-g20/g20-members/).

4 This number was calculated by using data on Total contribution of tourism and travel sector to GDP, (% of GDP) for G20 countries and World obtained from WTTC Data Gateway.

5 This information is obtained by using the data on CO_2 emissions (kt) and GDP, PPP (constant 2011 international $) for G20 countries and World taken from WB, WDI Database.

6 N-shaped and inverted N-shaped curve hypotheses were also tested. Estimation was performed based on the simplified model in column (5) of Table 5 by adding cubic term related to gdp (gdp^3), but as the coefficient on gdp^3 was not found to be statistically significant, results are not shown, but can be available upon request.

7 The elasticities were calculated by using mean values of *capital, fdi, tour, trade* and *labor,* respectively.

Chapter 4
Born-Again Globals:
A Case Study of a Non-Linear Internationalization Behavior

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ABSTRACT

Based on the literature on the Uppsala model, born-again globals, non-linear internationalization model, and late market entry, this chapter aims to portray the history, changes, and adaptations of OMEGA's internationalization process. This transitioning firm manufactures furniture and wooden hockey sticks. This chapter identifies that OMEGA follows a non-linear internationalization process and late entry into international markets. The principal added value of the case study presented here is related to presenting OMEGA's non-linear internationalization process, which displays reactive internationalization behavior in response to a saturated domestic market, typical of the Uppsala model, and which subsequently ends in a rapid internationalization process, as a born-again global, as a result of a change in its top management. During its internationalization process, OMEGA changed its internationalization pace, modes of entry, and export actions by adapting to the external environment and then changing its strategic focus.

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INTRODUCTION

When Small and Medium-sized Enterprises (SMEs) seek to exploit their competitive advantages they explore several types of internationalization strategies to enter overseas markets (Ribau, Moreira, & Raposo, 2018; Stanisauskaite & Kock, 2016). The internationalization process is related to the way companies explore international markets, as well as their export intensity. There are reactive and proactive reasons that lead to companies' internationalization, with different results as export performance is better among active internationalizers than reactive internationalizers (Ribau et al., 2017). Ultimately, companies seek to survive and grow in today's competitive markets, as well as increasing their profitability, in order to be able to expand to foreign markets (Carvalheira & Moreira, 2016).

Despite several competing theories explaining the different internationalization strategies used by SMEs (Ribau et al., 2015; 2018), one traditional theory is used extensively to explain the incremental perspective SMEs tend to use to become gradually involved in international markets through a series of evolutionary stages (Bell, McNaughton, & Young, 2001; Ribau et al., 2015). This is known as the Uppsala theory, which is useful to expand the behaviors of most small and medium-sized, family-owned companies. Although exporting is one of the least risky modes of entry to international markets, it can be very difficult for many companies as it is a dynamic and complex process involving buyers and sellers from different countries.

If it is easy to claim that companies need to be aware of international business contexts and keep abreast of international market trends, many non-exporting companies seek challenging objectives, such as export-led sales growth and increased profits from foreign markets. However, to internationalize those companies need to develop their capabilities and competitive advantages and assume a proactive behavior (Ribau et al., 2017; 2019).

Market globalization has been accompanied by the emergence of internationalized, more agile and flexible companies, known as born globals, based on early and rapid internationalization strategies that questioned the traditional internationalization models (Coviello, 2006; Coviello, 2015; Englis & Wakkee, 2015; Ribau et al., 2015). Other firms, internationalizing rapidly, albeit at a later stage in their life, are commonly referred to as born-again globals (Bell, McNaughton, & Young, 2001; Pinto, Ribeiro, & Moreira, 2018; Vissak & Francioni, 2013; Welch & Welch, 2009).

According to Kontinen and Ojala (2010), there are three main determinants of internationalization: the level of commitment to internationalization; the financial resources available; and the ability to commit and use these financial resources. The concept of born-again globals has been challenging the traditional pattern of internationalization, differing from other models in terms of pace and degree of internationalization. Born-again globals are typically well-established companies in their home markets that suddenly embrace rapid internationalization (Bell et al., 2001; Pinto et al., 2018), responding to critical events forcing them to shift their local focus to overseas markets, resorting to new networks and resources, engaging in multiple markets at the same time and adapting their products to foreign demand (Graves & Thomas, 2008; Pinto et al., 2018).

With an increase in export-led activities to face economic downturns in the domestic market and embrace overseas markets as a means of economic expansion, some firms are not only seeking to diversify their business and embrace international new markets. As such, this chapter aims to investigate the internationalization of a Portuguese company – named OMEGA for confidentiality reasons, established in the market since 1966 but only starting its internationalization path in 1999 – that manufactures furniture and wooden sports goods (hockey sticks). As a Portuguese company, OMEGA belongs to the groups of ‘‘intermediate economies’’ that have received little attention. As Portugal is a peripheral European country that is not at the forefront of innovativeness at global level, OMEGA might be considered a successful case of a national company growing through international markets, based on innovation and quality strategies in a relative technologically mature sector.

Based on the literature on internationalization, the born-again global theory, the nonlinear internationalization model and late market entry, this chapter aims to examine the nonlinear internationalization process of OMEGA from a historical perspective and debate the intricacies of the following main internationalization theories: the Uppsala model and the *born-again* theories, addressing their specificities in the case of OMEGA. This case study explores how due to a lack of internal resources, OMEGA’s internationalization is characterized by a late and nonlinear process. Moreover, the company’s three different business areas embrace different internationalization processes with different market entry modes, involving a growing learning process. Finally, the company was found to opt for foreign markets when it experienced difficulties in its saturated domestic market, and during its internationalization process, the involvement changed – in terms of pace, selection of countries and export actions – as adaptation of the three business areas to changing business environments differ. To complement this main objective, the following complementary objectives were defined:

1. To analyze how this company has evolved over time in the international arena.
2. To analyze how this company embraced new opportunities in international markets.
3. To analyze what led this company to choose its international growth strategy.
4. To contribute to a better understanding of how small companies competing in mature industries in intermediate countries manage their internationalization process.

The chapter is structured in six sections. After the first introductory section, the second section reviews the literature on internationalization covering the following topics: different types of internationalization, main modes of entry, motivations for internationalization and selection of target markets. The third section presents the methodology used. The fourth section briefly describes OMEGA and the main aspects covered by OMEGA’s three core businesses. The fourth section presents the results obtained, with the fifth section discussing them. Finally, section six presents the conclusions.

LITERATURE REVIEW

Internationalization Process

Since the 1960s, the world has witnessed rapid internationalization of markets, industries and companies. Different authors deal with concepts of internationalization based on incorporating several contextual understandings over time. As such, the topic has incorporated a wide range of theoretical perspectives as well as several analytical influences (Ribau et al., 2015; Ietto-Gillies, 2012). Internationalization might be understood as a business activity across countries (Olejnik & Swoboda, 2012) and is considered an important innovative and entrepreneurial activity. The various working definitions encompass different phenomena and involve the following activities (Chetty & Campbell-Hunt, 2003): spot and continuous export activities, cross-border collaboration, alliances, Greenfield investments, and the establishment of subsidiaries, branches and joint ventures.

Globalization of the economy and intense competition stimulate companies to explore forms of internationalization and contribute significantly to the economic development of countries, industries and productivity. Small and medium-sized enterprises (SMEs), playing a significant role in economic growth, face international competition in their domestic markets and are forced to compete overseas (Korsakiene & Tvaronavičiene, 2012). Even if SMEs are becoming active players in international markets, outward internationalization is a risky process even for experienced large firms (Meyer & Gelbuda, 2006). SMEs face two main challenges during internationalization (Johanson & Vahlne, 2009): liability of outsidership, which is lack of knowledge about international target markets and their players, and liability of foreignness, which is the psychic distance, covering factors such as laws and language barriers. Despite the risk assumed when competing abroad in unknown environments, the decision not to internationalize is seen as a riskier decision (George, Wiklund, & Zahra, 2005) as firms that do not internationalize can lose competitiveness and rely excessively on a single and / or domestic market (Hilmersson, 2014).

Internationalization decisions not only involve managerial commitment and are difficult to change, but also have long-term consequences for the company (Harms & Schiele, 2012). Despite various approaches and definitions of internationalization, this chapter assumes that internationalization is the expansion of the company's operations to foreign markets and may be the result of singular and independent decisions.

Following a historical timeline, Ribau et al. (2015) provide a schematic analysis of the main internationalization theories, their focus and underlying assumptions. Accordingly, it is clear that behavioral theories embracing an entrepreneurial perspective are emerging as the main perspectives explaining SME internationalization. Moreover, scale, scope and speed emerge as essential tools in explaining born globals, born regionals and born-again globals, complementing the traditional perspectives of internationalization used by the Uppsala model.

The Uppsala model deals with the acquisition of knowledge and how organizations internalize knowledge about foreign markets as they commit more resources to those markets (Johanson & Wiedersheim-Paul, 1975; Johanson & Vahlne, 1977; 2009). This model is based on four fundamental concepts – market knowledge, market commitment, commitment decisions and current activities – and on three basic assumptions (Forsgren, 2002). The first assumption is that lack of knowledge is a serious obstacle when companies seek to undertake international activities. The second assumption is that the uncertainties of international markets affect the decision to make investment abroad. Finally, the third assumption is that knowledge is difficult to transfer to other contexts and individuals, which normally hinders internationalization activities. As such, it is expected that companies internationalize first to close, culturally familiar markets, and afterwards to distant and culturally different markets, as occurs for example between Czech and German firms (Novotná, Martins, & Moreira, 2017).

The Uppsala model can be considered to propose that the greater the company's knowledge and market commitment the more the company will embrace the different stages of the internationalization path (Geldres-Weiss et al., 2016). As such, knowledge plays a decisive role: as soon as companies acquire the necessary knowledge, they will generate new opportunities and reduce uncertainty, which will support them in their quest for new knowledge to enter new external markets thereafter (Geldres-Weiss et al., 2016).

If most small and medium-sized family-owned companies internationalize according to the Uppsala model, some of them choose to internationalize rapidly, despite having remained for quite some time in their domestic market. These are considered born-again globals.

The literature on born-again globals explores a particular perspective as they adopt unique internationalization approaches: instead of gradually entering low-risk markets with close cultural, geographical and psychic ties, they rapidly become involved in new international markets, but at later stages of their life cycle (Schueffel et al., 2014). Born-again globals tend to explore their competitive advantages competing in their domestic markets, displaying quite the opposite behavior of born global companies, which normally seek to internationalize rapidly right after their inception (Schueffel et al., 2014). The internationalization of born-again globals is often triggered by certain “critical incidents” occurring within the firm or provoked by external partners that ultimately ‘force’ the company to adjust its internationalization activities significantly (Schueffel et al., 2014). Typical examples of critical incidents are a change of ownership or management or CEO of the company, which triggers a sudden change in company strategy, leading to a new internationalization process (Schueffel et al., 2014).

This is the main model that has challenged the traditional pattern of internationalization and differs in terms of pace and degree of internationalization with respect to the company’s background and characteristics, respectively. The following two variables are emphasized regarding born-again globals: time interval between inception and exporting and foreign sales percentage. The time interval between inception and exporting is a key element that has been used to differentiate born-again globals from traditional exporting SMEs. This dimension is also important in identifying these companies, which differ from born-globals by starting the internationalization process much later. The second important feature is the percentage of foreign sales, since this has often been used to indicate the degree of internationalization performance (Olejnik & Swoboda, 2012).

In conclusion, born-again globals are characterized as being completely focused on their domestic markets and being able to change their strategic focus radically by exploring foreign markets in order to increase sales. They differ from both traditional companies and born globals, since they omit certain traditional internationalization stages and present a different trajectory from born globals.

SMEs and Internationalization Characteristics

Critical events that often force SMEs to internationalize may be related to changes in management or ownership, sudden changes in the business environment and other factors (Vissak & Francioni, 2013). As internationalization is influenced by critical events, we can assume those critical events lead to nonlinear strategic behaviors, for example, the situation in which a company is: switching international entry modes; experiencing substantial changes in export actions; or in the pace of internationalization (Vissak, 2010).

The motivations that lead a company to internationalize can be subdivided into two types, proactive and reactive (Westhead, Ucbasaran, & Binks, 2004; Ribau et al., 2017). Proactive motivations are related to the idea of anticipating internationalization, i.e., firms initiate the internationalization process drawing on their own internal competencies or market opportunities, whereas reactive motivations to internationalization are closely linked with a passive attitude on the part of the company, as it only reacts to some events. Some examples of proactive motivations are the following: the creation of unique products for certain target markets; managerial commitment to entering new markets abroad; and a clear focus on product/market diversification. Reactive motivations are the result of competitive pressures, excess production capacity and saturation of the domestic market (Westhead, Ucbasaran, & Binks, 2004; Ribau et al., 2017). Although both types of strategies are common among SMEs, the performance of proactive internationalizers is better than that of reactive internationalizers (Ribau et al., 2017).

The ability to recognize opportunities in markets and networks is essential for companies to venture into new foreign markets and networks, emphasizing the important role of links in the internationalization process. Successfully entering new overseas markets depends on the company’s position in the network and the relationships it has managed to establish in the current market (Santangelo & Meyer, 2017). International networks are crucial for enhancing knowledge creation among businesses in inter-organizational relationships. In the same vein, local networks are regional-based networks, where companies can benefit from having close relationships with research institutions, universities, capital markets and specialized suppliers, among others (Andersson, Evers, & Griot, 2013).

Selecting target markets is a crucial task for successful internationalization. The best strategy for building new markets and the best market entry project plans are useless if the wrong markets are chosen (Grünig & Morschett, 2017). After this selection, it is time for companies to choose the international entry modes to reach their foreign markets. According to Grünig and Morschett (2017), exporting means that the manufacturer sells to any type of customer in a foreign country and they list five types of export activities: (a) to retailers or end consumers; (b) to retailers or end consumers represented by an agent; (c) to distributors; (d) to retailers or end consumers supported by their own representative office; and (e) to a self-selling subsidiary.

Modes of internationalization differ according to the needs of each company. There are two main types: indirect and direct export. Firms export indirectly when the exporting firm uses independent intermediaries located in its country of origin, whereas direct export is the operation in which the exported product is invoiced by the producer to the importer (Grünig & Morschett, 2017). According to Keller and Kotler (2006), the former has the following advantages: easier initial penetration; lower representation costs; and lower risk perception. The main disadvantages are the following: less control and information about the market; and the absence of an entry strategy. Direct exports have the advantages of greater market information, greater control of distribution channels, total or partial control of the strategic marketing plan, and greater protection of the brand, patents and other intangible properties, despite the greater difficulties with initial penetration, higher structural costs and risks.

Whatever the mode of internationalization adopted, there are barriers that prevent companies from entering foreign markets. Internal barriers may include limited information about foreign markets, difficulties in contacting customers, language and cultural problems, lack of adequate export staff, insufficient production capacity, insufficient capital, inability to meet export requirements and a lack of reliable foreign distributors. External barriers include the complexity of export procedures, issues with payment collection abroad, high transportation costs, unfavorable local government regulations, political instability in markets, strong foreign competition and currency fluctuations (Haddoud, Onjewu, Jones, & Newbery, 2018).

METHODOLOGY

This chapter focuses on a case study – OMEGA – and involves qualitative analysis of an SME based in Oliveira de Azeméis, Portugal, whose core business is based on wood processing and transforming activities. The choice of OMEGA was based on the fact that it is already operating in international markets and the desire to analyze an organization that operates in several areas of activity.

The research method selected was the case study, as this allows the analysis of specific situations, the combination of previously developed theories with new empirical results, investigating phenomena within their real life contexts, the analysis of retrospective information and the development of new theoretical and practical insights (Chetty, 1996; Eisenhardt, 1989; Ghauri, 2004). Since nonlinear internationalization is a complex process, the case study method is also best suited for a longitudinal perspective (Vissak &

Francioni, 2013; Welch & Welch, 2009). This chapter is based on a single case study, which helps the depth of the analysis (Piekkari et al., 2009; Voss et al., 2002). Moreover, the case study methodology used a research method with inductive / deductive approaches, which were considered to be the most appropriate in this research as it involved explanatory and exploratory aspects (trying to deal with the 'why' and 'how'), and most appropriate to uncover relational aspects developing over time (Yin, 2008), around the focal firm's internationalization process.

OMEGA was selected based on judgmental/purposive sampling (Patton, 2015), which involves the selection of cases that meet three important requirements for this research: (a) experience of the idiosyncrasies associated with international business activities; (b) being an SME involved in manufacturing activities; and (c) having several core businesses aimed at different market segments.

In data collection, a qualitative methodology was used, through a semi-structured interview with the head of OMEGA's financial area in May 2019. Data collection involved gathering primary and secondary information obtained from interviews and public sources, such as the firm's website, marketing information from industrial associations and multiple observations. Obtaining information from different sources was important to ensure the validity and reliability of data (Andersen & Skaates, 2004; Ghauri, 2004). The interview lasted approximately one hour and thirty minutes, complemented by a visit to the company production units of both home and hotel furniture and hockey sticks. The interview and complementary visit allowed us to study managerial actions regarding internationalization of activities and supported our goal of studying the evolution of internationalization activities. This procedure helped the interviewees feel more comfortable while speaking in their own environment and enabled events to be observed in their natural setting, instead of relying solely on pre-arranged single interviews. The researchers maintained a passive and unobtrusive presence, not to interfere with on-going events and activities.

The visit to the manufacturing unit was important for the interviewers to familiarize themselves with both the different types of products and the production unit environment. In this way, the researchers were able to improve their understanding of the examples given by the interviewees. After each visit, the researchers' impressions were attached to the summary of each interview.

The interviewers began by explaining the research, guaranteeing anonymity and requesting authorization to audio-record the interview. The interview script sought to explore the evolution of international paths and activities used by the firm in its internationalization process. The interview script included questions to triangulate the information obtained from informants with additional information obtained through the firm's website and public sources (e.g. firm size, age, international presence/experience, export ratio, export markets, current markets, etc.).

Data from all sources were collected and transcribed into a single case story, helping to identify missing information.

PRESENTATION OF THE COMPANY

Contextualization

In Portugal there are around 1,626 micro, small and medium-sized companies producing wooden furniture, among which OMEGA stands out in several aspects. Analyzing the sectoral data of the Bank of Portugal, the percentage of OMEGA's external sales volume is currently found to be higher than the industry average, since OMEGA's percentage is about 65%, while the industry average is 46%.

OMEGA is a 100% Portuguese brand, originally founded in 1966 and headquartered in Oliveira de Azeméis, Portugal. The company started by producing loose pieces in house carvings (for example showcases and hangers) and grew with the desire to create, produce and export Portuguese furniture. The first experience in foreign markets coincided with the 1994 economic crisis in Portugal. The founder's passion for roller hockey as well as the local tradition of the sport led the company to manufacture hockey sticks. Its current own brand appeared only in 2012, with the passing of the owner-manager. In 2019 OMEGA has around 50 employees, some of whom have been working for OMEGA for 42 years, as the interviewee mentioned. Currently, the company has a total area of 9,460 m^2, with its manufacturing area of 5,309 m^2.

Having started its operations over 50 years ago, the company now has three distinct core business areas: OMEGA FURNITURE – upscale home furnishings, OMEGA CONTRACT – hotel furniture and OMEGA SPORT – manufacturing hockey sticks. The company has internationalized only in the last two business areas, where it is positioned as one of the main Portuguese players (OMEGA CONTRACT) and as the Portuguese market leader (OMEGA SPORT). It exports to more than 20 countries. As the company seeks to produce unique, customized parts according to clients' specifications, it supports its customers during the design, building and maintenance of each part made using the latest technologies. Tradition and timeliness are OMEGA's main values, which combined with the know-how acquired over the generations, have allowed the company to outcompete main players in high-end market sectors. Nowadays, it is trying to reposition its portfolio incorporating ecological and sustainable lines, which reveals the company's capacity to face the new demands of a more environmentally responsible world.

Production Processes

The company competes in three distinct core business areas, although it has two major production processes, namely, the home and hotel furniture unit and the sports unit.

The home and hotel furniture unit involves several phases before the furniture is assembled on site. After leaving the drawing board, several types of boards or solid wood are used in the machining phase. Afterwards, various cutting techniques are applied in the woodcraft phase so that the different pieces/lots are assembled to prepare the furniture and disassembled again to enter the final phase of varnishing and finishing. In the dispatch phase the furniture is sent to the customer in several parts, and assembled on site.

The manufacturing process in the sports unit is much more complex and time-consuming than in the home and hotel furniture unit. Therefore, a more detailed, guided tour of this area was necessary to understand it properly. Briefly, the process involves laminating the wood, gluing the various strips to the blades and inserting them into a mold where they stay for about two days. After preparing the hockey handles and placing a denim-like fabric in the middle of the two blades – process phase known as milling, relying heavily on robots – a protective coat is applied to facilitate painting, varnishing and carving. Finally, advertising is printed on the stick.

Main Competitors

Over time, OMEGA has been competing in the market with several national and international manufacturers. Nevertheless, it has managed to increase its market share. When asked to identify its main competitors, the company was spontaneous in mentioning the following: YPSILON as the main competitor to OMEGA SPORT, ALPHA as the main competitor to OMEGA FURNITURE and BETA, ALPHA, GAMMA and ETA as the main competitors to OMEGA CONTRACT.

YPSILON is a Spanish company, located in Cerdanyola del Vallés, Barcelona, Spain. It is YPSILON's main competitor in the roller hockey industry. Currently led by Josep Vigueras, YPSILON has over fifty years of history and is defined as "the brand of sticks". It has such great visibility in this market that the Portuguese Skating Federation and the Royal Spanish Skating Federation use YPSILON's hockey sticks in their official competitions (Spain and Portugal are the two main world roller hockey contenders).

ALPHA was created in 1994 as a handmade furniture manufacturing company. Headquartered in Paços de Ferreira, Portugal, the company offers a turnkey service, manufacturing exclusive customized furniture pieces. Its mission states "Our limit is the customer's imagination". This company has clients worldwide mainly in hotels, restaurants and luxury villas.

BETA was created in 1952 by Viriato Rocha. Beta can be defined as one of the few companies manufacturing furniture and offering a customized decoration services on a worldwide scale. It has technical capacity to develop turnkey projects on a worldwide basis. Bata supplies major hotel chains such as Marriot, Sheraton, Meridien, Intercontinental, Hilton, Pestana, Club Med, among many others.

GAMMA was founded in 1970, by António Brito. It has around 70 workers and is headquartered in Porto, Portugal. In addition to being a reference company in the furniture market in Portugal, it has a strong international presence, exporting more than 80% of its production. It is present in countries like France, Germany, Italy, Belgium, United Kingdom, Brazil, USA, Russia, China, India, Egypt, Morocco, among others. Over the past 10 years, it has had a global turnover of around €60 million.

ETA was founded in 1949, with headquarters in Paredes, Portugal. It is currently led by Manuel Campos. It started its internationalization in 1995 and international markets represent 70% of its turnover.

RESULTS

OMEGA was created in 1966 with its own brand name, which was modified in 2012. Originally, OMEGA produced only household furniture and sold it in the domestic market and manufactured hockey sticks only due to the owner-manager's particular interest, with these two activities representing 100% of its revenue. In 1994, with the crisis felt in the domestic market, OMEGA began its international activities with domestic furniture. Afterwards, the hotel industry was targeted, and finally, the sports market, which also led to the change to its current brand name, with the main objective of facilitating brand awareness. The main reason for targeting markets abroad was reactive, as the domestic market was starting to shrink. As such, OMEGA felt the need to explore new international markets to exploit its unique skills across borders.

Table 1, presenting the overall sales volume and the breakdown into domestic and foreign markets over time, shows that sales have grown almost systematically since 1999, especially in 2012 (from €1,845,515 to €3,231,820), which is justified by the change in management bodies, with the former owner-manager stepping down his activity of managing partner and the stepping up of the new CEO, who brought innovative ideas and new projects. It is worth mentioning that the growth of the overseas market is due to implementation of the internationalization strategy and registration of the new brand. In general, foreign sales have gradually been replacing domestic sales since 1999. Although there has been a slight decrease in foreign markets since 2013 to the present, these values are twice as much as those of the domestic market.

Table 1. Sales volume of OMEGA by types of markets (in Euros)

	Internal market (€)	EU market (€)	Other markets (€)	Total Sales Volume (€)	% of Internal market	% of Foreign market
1999	1,113,701	-	-	1,113,701	100.0	-
2000	1,575,053	1,348	-	1,576,401	99.0	0.1
2001	1,556,227	2,246	59,376	1,617,849	96.2	3.8
2002	1,631,401	514	20,239	2,652,155	98.7	1.3
2003	2,393,674	34,583	26,762	1,455,018	95.8	4.2
2004	1,383,398	63,609	-	1,447,006	95.6	4.4
2005	1,657,768	106,140	-	1,763,908	94.0	6.0
2006	1,699,918	93,875	18,080	1,811,843	93.8	6.2
2007	1,100,443	190,005	2,686	1,296,733	84.9	15.1
2008	1,713,150	220,887	187,148	2,121,185	80.8	19.2
2009	595,797	555,995	46,191	1,197,983	49.7	50.3
2010	1,096,576	516,486	28,329	1,641,390	66.8	33.2
2011	642,542	1,160,138	42,835	1,845,515	34.8	65.2
2012	417,712	2,418,362	395,745	3,231,820	12.9	87.1
2013	470,970	2,699,272	48,253	3,218,495	14.6	85.4
2014	652,223	2,429,505	394,671	3,476,398	18.8	81.2
2015	983,446	3,204,028	572,814	4,760,289	20.7	79.3
2016	1,005,560	2,391,972	197,530	3,595,071	28.0	72.0
2017	1,206,825	3,023,916	49,943	4,280,683	28.2	71.8
2018	1,231,882	2,190,785	118,878	3,541,545	34.8	65.2

On entering international markets, OMEGA began to concentrate its three core businesses, bringing together production activities into two major groups: a) furniture, which concentrates OMEGA FURNITURE and OMEGA CONTRACT; and b) OMEGA SPORT. As these two business areas have huge differences in the production processes, they are separated from each other within the company. Hotel projects reach OMEGA already clearly defined, according to hoteliers' wants and needs, and the company only needs to produce exactly what is agreed upon with them. Home furnishings are produced according to the catalog and the hockey sticks are essentially a standard product, although, on request, exceptionally they can be customized. The strategies to enter international markets also differ. On the one hand, furniture areas are characterized by participation in trade fairs, individualized marketing efforts (for example, through queries and requests on the site) and targeting architectural offices abroad. On the other hand, the sport area has more direct marketing approaches, i.e., there are contacts from clubs and / or retailers, as well as brand awareness and presence at international events (such as the European and World hockey championships) is mandatory.

Table 2 summarizes the weight of each area in both national and international markets and the respective monetary value for some reference years.

Table 2. Furniture and Sports market sales (in Euros)

<table>
<tr><th></th><th>2000</th><th colspan="2">%</th><th>2009</th><th colspan="2">%</th><th>2012</th><th colspan="2">%</th><th>2017</th><th colspan="2">%</th><th>2018</th><th colspan="2">%</th></tr>
<tr><td colspan="16">Furniture</td></tr>
<tr><td>Internal market</td><td>1,575,053</td><td>99.1</td><td rowspan="2">100</td><td>595,797</td><td>49.7</td><td rowspan="2">100</td><td>396,826</td><td>12</td><td rowspan="2">95</td><td>844,777</td><td>20</td><td rowspan="2">70</td><td>999,824</td><td>28</td><td rowspan="2">81</td></tr>
<tr><td>External market</td><td>1,348</td><td>0.1</td><td>602,186</td><td>50.3</td><td>2,673,402</td><td>83</td><td>2,151,701</td><td>50</td><td>1,870,827</td><td>53</td></tr>
<tr><td colspan="16">Sports</td></tr>
<tr><td>Internal market</td><td>-</td><td></td><td></td><td>-</td><td></td><td></td><td>20,886</td><td>1</td><td rowspan="2">5</td><td>362,047</td><td>8</td><td rowspan="2">30</td><td>234,057</td><td>7</td><td rowspan="2">19</td></tr>
<tr><td>External market</td><td>-</td><td></td><td></td><td>-</td><td></td><td></td><td>140,705</td><td>4</td><td>922,158</td><td>22</td><td>438,836</td><td>12</td></tr>
</table>

OMEGA FURNITURE AND OMEGA CONTRACT

As the Portuguese market in these two areas is very small (the quality of the furniture is well above average and a high-end product makes the price too high for the majority of the Portuguese public), OMEGA tried to enter the foreign market in 1994, with the company showcasing its home furnishing products at the international fairs of Madrid and Valencia, in Spain. The presence in those exhibitions supported OMEGA in 2000, i.e., six years later, in exporting its upscale home and hotel furnishing products to Spain. Although it took several years, this was important, since from 2000 to 2009 foreign markets grew quickly, with furniture representing 100% of its international performance. After those entries OMEGA decided to participate in trade fairs in Italy, Algeria and France.

As soon as OMEGA started serving markets beyond the Iberian Peninsula, it began to attend international trade fairs as a way to increase brand awareness in the furniture markets. OMEGA realized that it needed to be present in international fairs (currently, the most relevant ones for the company are those of Paris, France and Milan, Italy) to exploit the home furnishings market and that they needed to increase their representatives in foreign countries to expand their sales in the hotel industry, with contacts with architectural offices. This is related to the production processes of the two areas being different: while that of home furniture is characterized by the production of order-based parts, which are standardized and cataloged, that of the hotel industry is characterized by unique, customized furniture for specific customers.

From 2012 onwards, with the increased exports of OMEGA SPORT, the furniture business areas ceased to represent 100% of the company's international performance. Even so, this accounted for about 95% of total sales, of which 83% went to the foreign market (2,673,402 €). In 2017 and 2018, the same business behavior occurs, although the turnover value of furniture has not changed substantially. Still, the foreign market has always remained larger than the domestic market. OMEGA is currently responsible for supplying these products to customers worldwide.

OMEGA SPORT

OMEGA began to internationalize its sports business in 2009, reaching around 4% of foreign sales in 2012 – corresponding to 140,705 € of sales, i.e., 5% of the company's turnover – which indicates that three years after starting its export activities, OMEGA SPORT already had a significant share of its sales overseas. It is important to note that in 2017 and 2018, despite some variations in the turnover associated with this sector, the percentage associated with the external market is always higher than that of the domestic market, demonstrating that OMEGA is essentially an exporter. In this business activity, hockey stick production has been intensified for about 10 years and nowadays OMEGA is able to customize the player's hockey stick.

The typical mode of entry into foreign markets involves essentially brand awareness investments. OMEGA is able to export to foreign markets through contacts with hockey clubs and foreign dealers. Hockey clubs place orders directly, because they already know the brand and OMEGA invests in a direct relationship with them. The countries to which the company exports its sports products are mainly in Europe, but also include the USA, Angola, Colombia, Egypt, Argentina, Brazil, Chile and Australia.

DISCUSSION

For years following its foundation, OMEGA focused exclusively on the domestic market, and only after 1994, with the economic crisis affecting the Portuguese economy, did it feel the need to explore international markets. If its internationalization process began slowly (in 2004 international sales accounted for only 4.4% of all sales), OMEGA experienced a rapid turnaround when in 2009, about four years later, foreign sales already represented a significant 50.3% of the company's total sales. The time needed to invest in establishing networks abroad, which was longer than expected, is one possible explanation for this modest initial engagement in entering new international markets. This networking experience was also influenced by foreign clients' positive acceptance of its products. However, after OMEGA's initial success, it was easier for them to develop those markets abroad. In general, OMEGA's behavior can be considered reactive, as the decline in domestic sales led to the need to resort to markets abroad. Only then did OMEGA actively look for potential customers / markets, as shown in their presence in international trade fairs in order to make their products known to potential international clients. After analyzing OMEGA's internationalization path, one can conclude that it shows, ta the initial stages of the internationalization process, the specific characteristics of a typical sequential/linear Uppsala model of internationalization and, afterwards, clear signs of a typical born-again global.

OMEGA serves its international markets producing on an exclusively domestic basis. The company is frequently present in specialized international fairs in the furniture sector, and most of their international contacts come from those networking activities. In furniture for the hospitality industry, which works on a project-by-project basis with tight budgets, OMEGA has a wide range of resellers which are mainly architectural offices. Export activities in OMEGA SPORT are made directly in close contact with customers.

In short, the company is seen to carry out direct exports, namely through OMEGA FURNITURE and OMEGA SPORT, and indirectly through OMEGA CONTRACT.

One can conclude that international sales were fluctuating over time (for example, in 2009 foreign sales accounted for 50.3%, in 2010 it decreased to 33.2% and the following year it rose again to 65.2% of the company's total sales). According to the company's manager, this fluctuation is the result of necessary adaptations to sudden market changes, which force the company to withdraw from some markets and to aggressively compete in others. Several difficulties/barriers were pointed out, such as the great opening by the Algerian government when the company was trying to enter this market, and the creation of barriers to foreign companies soon afterwards (if there is indigenous capacity for assuming production locally, the government gives almost exclusive preference to national production and creates numerous barriers to external suppliers). Another difficulty noted was the increasing competition from countries such as Poland and India that have cheaper labor forces and high customs duties. The way OMEGA managed to overcome some of the barriers mentioned above was using its product quality advantage, complemented with constant innovation (they are currently developing a hockey stick with a built-in sensor) and the possibility of customizing their products at customers' request, which is a clear indication of strong core competencies that support OMEGA's international competitiveness.

When choosing its target countries, OMEGA takes several factors into account. In some countries, such as Brazil or Chile, excessive custom charges – between 30% and 40% – make it impossible for OMEGA to try to enter them. Since export is its mode of entry into various countries / markets, the company seeks to operate in countries where the rates applied are more affordable to avoid high transport costs to the destination country.

A curious example was provided during the interview, namely the case of a Colombian client with a representative in Hong Kong. Instead of shipping hockey sticks directly to Colombia, as its Colombian customer has a delegation in Hong Kong, OMEGA was able to invoice its products in Hong Kong at affordable rates when compared to those they would have paid if shipping the products directly to Colombia. Thereafter, the Colombian customer is responsible for transporting the hockey sticks to Colombia. A win-win situation for both companies.

OMEGA SPORT seeks resellers abroad who want to work with the company, so that their products have easier access to the end customer in several international markets.

Within the group of countries in which OMEGA operates, France, Belgium, Luxembourg, Saudi Arabia and Algeria are the hotel markets that stand out. More recently, they have managed to start several projects in French Polynesia.

It is also important to emphasize OMEGA's preference for European Union countries, as they allow free movement of people, goods and capital, on the one hand, making it easier to reach several target markets and, on the other, because of the smaller geographical distance, which limits transportation costs and lowers travel costs for company representatives and customers.

Finally, especially in the hotel sector, another difficulty OMEGA has experienced is in creating a relationship based on trust and commitment, which is very laborious and time consuming. Since these contacts take place through architectural offices that already have a project previously designed with the end customer – to create and adjust the furniture to the customer's taste / need or the architectural plan – several visits are required, both from the client to the company and from company representatives to the destination sites, which makes the entire process time-consuming and costly. Indeed, even if OMEGA's end customers were located in Europe, although the business-to-customer distance is less than to certain locations outside Europe, the process remains lengthy as a result the multiple visits necessary to define the final product.

Since OMEGA's work base is customizing the product according to the customer's wishes, mainly in the hotel business where they work on a project-by-project basis, there is hardly any strategy of product standardization. However, different markets use different types of furniture. For example, classic furniture is desired in Saudi Arabia, while modern furniture with straight lines is the most common in Europe. Communication is through the local dealers, who end up adapting the communication slightly to the receiving country's culture and language. Otherwise, communication is very similar for all countries.

Concerning prices, the business policy remains unchanged and the same price is charged for all markets. For example, the price for hockey sticks varies between 60 and 70 €.

This case study could be highlighted as a good example of how there are growth opportunities based on innovation and quality-based competitive strategies, even in intermediate countries and mature industries (Molero & García, 2008). Moreover, OMEGA shows that the Portuguese furniture industry, at industry level and in terms of innovative dynamism and national relative specialization, can be considered a stationary specialization, as the host country shows technological advantages but the industry shows scarce technological dynamism to compete at worldwide basis, which is tuned to García-Sánchez, Molero, & Rama (2016).

CONCLUSION

The OMEGA's case study clearly reveals that the company can be classified as having two main types of behavior: firstly, as a typical family-owned firm embracing a linear, sequential internationalization path, driven by decreasing sales in its domestic market, which is the typical behavior of firms following the Uppsala theory; and as a born-again global, because it entered the foreign markets quite late after its inception as a result in top management changes, which reflects an active process of internationalization, quite different from the previous one. If the decreasing sales in its domestic market can be considered a push factor in inducing an outward internationalization path, very typical in firms following a passive internationalization behavior, the stepping up of the new CEO is the main critical event associated with the rapid sales in overseas markets as a born-again global, which is an active internationalization behavior. Therefore, one can conclude that the internationalization of OMEGA is characterized by being a nonlinear process and the company started it in a late period of its market operations.

Regarding international markets, OMEGA has been using active strategies: (a) international trade fairs as the main strategy to promote the brand name and invest in networking activities; and (b) direct exports to furniture architecture offices. In the latter mode, OMEGA CONTRACT has been more successful than OMEGA FURNITURE. The company has invested in promoting its brand name through advertising sports events and through marketing and advertising in social networks. It has recently invested in local foreign resellers in order to increase the sale of hockey sticks abroad. In order to reach their foreign clients, they use indirect exports, mainly in OMEGA FURNITURE and CONTRACT, and direct exports in marketing OMEGA SPORT's hockey sticks.

As their foreign markets are very volatile, largely due to their order-based type of business, the time elapsing between orders can fluctuate over time. Despite OMEGA's willingness to embrace a smooth internationalization process, a nonlinear internationalization process is prevalent.

In the three areas OMEGA is involved in – FURNITURE, CONTRACT and SPORT – the main similarities between them are the fact that all areas are active in foreign markets, both in the European Union and elsewhere. This clearly indicates that OMEGA, that belongs to an intermediate country, which can be considered a stationary specialization in the furniture industry at national level, managed to explore their capabilities to embrace growth opportunities based on innovation and quality-based competitive strategies.

Regarding the uneven business areas, it is noted that not only is the process of preparing and producing the final products quite different, but they also serve completely different needs. There are also significant differences in their sales volume: the two business activities related to furniture have always had larger sales volumes than the sports business unit. Finally, the areas of home furnishings and hotels were the company's first attempts at internationalization, with hockey sticks entering foreign markets much later.

Table 3 provides a summary of the topics covered throughout the chapter concerning the internationalization of OMEGA.

Table 3. Overview of the case study

Number of Employees	50
Main core businesses	OMEGA FURNITURE, OMEGA CONTRACT and OMEGA SPORT
Exports (%)	65.2% in 2018
Main markets	England, Northern Ireland, Netherlands, Germany, Austria Luxemburg, France, Spain, Italy, Algeria, Egypt, Russia, Gibraltar, USA, Angola, Colombia, Argentina, Brazil, Chile, Uruguay, India, Japan and Australia.
Critical events	The company has above-average quality furniture at premium prices, which in a time of crisis led to a decrease in sales. OMEGA started evolving progressively in international markets until the stepping down of the owner-manager and the stepping up of the new CEO was a critical event that sparked OMEGA's sudden rapid growth in international markets.
Uppsala model	One can classify the company as a typical company following a progressive evolution in international markets as a result of a passive internationalization behavior triggered by decreasing sales in domestic markets and the appointment of a new CEO.
Born-again globals	One can classify the company as a born-again global as a result of a rapid growth in international markets. This is the consequence of the stepping down of the owner-manager and the stepping up of the new CEO.
Non-linear internationalization	The company has clear levels of fluctuation in its annual export volumes as a result of the need to "divest" in one country and entering another, as well as the need to overcome emerging barriers in the process.
Main motivations	The new CEO brought about different perspectives about marketing and internationalization strategies. Those new ideas generated new projects.
Target market selection	OMEGA takes into account customs tax rates for deciding the success of the internationalization process for each country.
Marketing approach	Presence in international trade fairs in order to reach new clients and improve networking activities. Direct contacts with targeting architectural offices abroad. Strong presence in social networks. Involvement in major ring hockey sports events.
Modes of entry	Exports are the main mode of entry.

REFERENCES

Andersen, P. H., & Skaates, M. A. (2004). Ensuring validity in qualitative international business research. In R. Marschan-Piekkari & C. Welch (Eds.), Handbook of qualitative research methods for international business (pp. 464–485). Massachusetts: Edward Elgar. doi:10.4337/9781781954331.00045

Andersson, S., Evers, N., & Griot, C. (2013). Local and international networks in small firm internationalization: Cases from the Rhône-Alpes medical technology regional cluster. *Entrepreneurship and Regional Development*, *25*(9-10), 867–888. doi:10.1080/08985626.2013.847975

Bell, J., McNaughton, R., & Young, S. (2001). 'Born-again global' firms – An extension to the 'born global' phenomenon. *Journal of International Management*, *7*(3), 173–189. doi:10.1016/S1075-4253(01)00043-6

Carvalheira, A., & Moreira, A. C. (2016). Searching for Opportunities and Trust in International Markets. Entrepreneurial Perspective of a Traditional Industry SME. In L. C. Carvalho (Ed.), Handbook of research on entrepreneurial success and its impact on regional development (pp. 675–701). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9567-2.ch028

Chetty, S. (1996). The case study method for research in small- and medium-sized firms. *International Small Business Journal*, *15*(l), 73–85. doi:10.1177/0266242696151005

Chetty, S., & Campbell-Hunt, C. (2003). Paths to internationalisation among small to medium-sized firms: A global versus regional approach. *European Journal of Marketing*, *37*(5/6), 796–820. doi:10.1108/03090560310465152

Coviello, N. (2006). The network dynamics of international new ventures. *Journal of International Business Studies*, *37*(5), 713–731. doi:10.1057/palgrave.jibs.8400219

Coviello, N. (2015). Re-thinking research on born globals. *Journal of International Business Studies*, *46*(1), 17–26. doi:10.1057/jibs.2014.59

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550. doi:10.5465/amr.1989.4308385

Englis, P. D., & Wakkee, I. (2015). Managerial mindset and the born global firm. In A. Groen, G. Cook, & P. Van der Sijde (Eds.), *New Technology Based Firms in the New Millennium* (pp. 9–17). Emerald Publishing Limited. doi:10.1108/S1876-022820150000011009

Forsgren, M. (2002). The concept of learning in the Uppsala internationalization process model: A critical review. *International Business Review*, *11*(3), 257–277. doi:10.1016/S0969-5931(01)00060-9

García-Sánchez, A., Molero, J., & Rama, R. (2016). Are "the best" foreign subsidiaries cooperating for innovation with local partners? The case of an intermediate country. *Science & Public Policy*, *43*(4), 532–545. doi:10.1093cipolcv057

Geldres-Weiss, V., Uribe-Borquez, C., Coudounaris, D., & Monreal-Perez, J. (2016). Innovation and experiential knowledge in firm exports: Applying the initial U-model. *Journal of Business Research*, *69*(11), 5076–5081. doi:10.1016/j.jbusres.2016.04.083

George, G., Wiklund, J., & Zahra, A. (2005). Ownership and the internationalization of small firms. *Journal of Management*, *31*(2), 210–233. doi:10.1177/0149206304271760

Ghauri, P. (2004). Designing and conducting case studies in international business research. In R. Marschan-Piekkari & C. Welch (Eds.), Handbook of Qualitative Research Methods for International Business (pp. 109–124). Massachusetts: Edward Elgar. doi:10.4337/9781781954331.00019

Grünig, R., & Morschett, D. (2017). Developing International Strategies. New York: Springer. doi:10.1007/978-3-662-53123-5

Haddoud, M. Y., Onjewu, A.-K., Jones, P., & Newbery, R. (2018). Investigating the moderating role of export promotion programmes using evidence from North-Africa. *Critical Perspectives on International Business*, *14*(2-3), 282–308. doi:10.1108/cpoib-11-2016-0059

Harms, R., & Schiele, H. (2012). Antecedents and consequences of effectuation and causation in the international new venture creation process. *Journal of International Entrepreneurship*, *10*(2), 95–116. doi:10.100710843-012-0089-2

Hilmersson, M. (2014). Small and medium-sized enterprise internationalisation strategy and performance in times of market turbulence. *International Small Business Journal*, *32*(4), 386–400. doi:10.1177/0266242613497744

Ietto-Gillies, G. (2012). *Transnational corporations: Fragmentation amidst integration*. Routeldge.

Johanson, J., & Vahlne, J. (2009). The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership. *Journal of International Business Studies*, *40*(9), 1411–1431. doi:10.1057/jibs.2009.24

Johanson, J., & Vahlne, J.-E. (1977). The internationalization process of the firm – a model of knowledge development and increasing foreign market commitments. *Journal of International Business Studies*, *8*(1), 23–32. doi:10.1057/palgrave.jibs.8490676

Johanson, J., & Wiedersheim-Paul, F. (1975). The internationalization of the firm: Four Swedish cases. *Journal of Management Studies*, *12*(3), 305–322. doi:10.1111/j.1467-6486.1975.tb00514.x

Kontinen, T., & Ojala, A. (2010). The internationalization of family businesses: A review of extant research. *Journal of Family Business Strategy*, *1*(2), 97–107. doi:10.1016/j.jfbs.2010.04.001

Korsakiene, R., & Tvaronavičiene, M. (2012). The internationalization of SMEs: An integrative approach. *Journal of Business Economics and Management*, *13*(2), 294–307. doi:10.3846/16111699.2011.620138

Kotler, P., & Keller, K. (2006). Marketing Management. Upper Saddle River, NJ: Prentice Hall.

Meyer, K. E., & Gelbuda, M. (2006). Process perspectives in international business research in CEE. *Management International Review*, *46*(2), 143–164. doi:10.100711575-006-0042-5

Molero, J., & García, A. (2008). The innovative activity of foreign subsidiaries in the Spanish innovation system: An evaluation of their impact from a sectoral taxonomy approach. *Technovation*, *28*(11), 739–757. doi:10.1016/j.technovation.2008.03.005

Novotná, L., Martins, I., & Moreira, A. C. (2017). Trade between the Czech Republic and Portugal: Analysis of the 2000-2015 Period. In T. Dorożyński & A. Kuna-Marszałek (Eds.), Outward foreign direct investment (FDI) in emerging market economies (pp. 200–225). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2345-1.ch010

Olejnik, E., & Swoboda, B. (2012). SMEs' internationalisation patterns: Descriptives, dynamics and determinants. *International Marketing Review*, *29*(5), 466–495. doi:10.1108/02651331211260340

Patton, M. Q. (2015). Qualitative Evaluation and Research Methods. New York: Sage.

Piekkari, R., Welch, C., & Paavilainen, E. (2009). The case study as disciplinary convention: Evidence from international business journals. *Organizational Research Methods*, *12*(3), 567–589. doi:10.1177/1094428108319905

Pinto, L., Ribeiro, M., & Moreira, A. C. (2018). Challenging the theoretical lenses of internationalization: A case study analysis. In C. Machado & P. Davim (Eds.), Enhancing Competitive Advantage with Dynamic Management and Engineering (pp. 112–137). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-5360-1.ch005

Ribau, C., Moreira, A. C., & Raposo, M. (2015). Internationalisation of the firm theories: A schematic synthesis. *International Journal of Business and Globalisation*, *15*(4), 528–554. doi:10.1504/IJBG.2015.072535

Ribau, C., Moreira, A. C., & Raposo, M. (2017). SMEs innovation capabilities and export performance: An entrepreneurial orientation view. *Journal of Business Economics and Management*, *18*(5), 920–934. doi:10.3846/16111699.2017.1352534

Ribau, C. P., Moreira, A. C., & Raposo, M. (2018). SME internationalization research: Mapping the state of the art. *Canadian Journal of Administrative Sciences*, *35*(2), 280–303. doi:10.1002/cjas.1419

Ribau, C. P., Moreira, A. C., & Raposo, M. (2019). The role of exploitative and exploratory innovation in export performance: An analysis of plastics industry SMEs. *European Journal of International Management*, *13*(2), 224–246. doi:10.1504/EJIM.2019.098149

Santangelo, G. D., & Meyer, K. E. (2017). Internationalization as an evolutionary process. *Journal of International Business Studies*, *48*(9), 1114–1130. doi:10.105741267-017-0119-3

Schueffel, P., Baldegger, R., & Amann, W. (2014). Behavioral patterns in born-again global firms: Towards a conceptual framework of the internationalization activities of mature SMEs. *Multinational Business Review*, *22*(4), 418–441. doi:10.1108/MBR-06-2014-0029

Stanisauskaite, V., & Kock, S. (2016). The dynamic development of international entrepreneurial networks. In H. Etemad, S. Denicolai, B. Hagen, & A. Zucchella (Eds.), The changing global economy and its impact on international entrepreneurship (pp. 119–135). Massachusetts: Edward Elgar. doi:10.4337/9781783479849.00012

Vissak, T. (2010). Nonlinear internationalization: a neglected topic in international business research. In D. Timothy, P. Torben, & T. Laszlo (Ed.), The past, present and future of international business & management (Vol. 23, pp. 559–580). Bingley: Emerald Group Publishing. Doi: doi:10.1108/S1571-5027(2010)00000230029

Vissak, T., & Francioni, B. (2013). Serial nonlinear internationalization in practice: A case study. *International Business Review*, *22*(6), 951–962. doi:10.1016/j.ibusrev.2013.01.010

Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case Research in Operations Management. *International Journal of Operations & Production Management*, *22*(2), 195–219. doi:10.1108/01443570210414329

Welch, C. L., & Welch, L. S. (2009). Re-internationalisation: Exploration and conceptualization. *International Business Review*, *18*(6), 567–577. doi:10.1016/j.ibusrev.2009.07.003

Westhead, P., Ucbasaran, D., & Binks, M. (2004). Internationalisation strategies selected by established rural and urban SMEs. *Journal of Small Business and Enterprise Development*, *11*(1), 8–22. doi:10.1108/14626000410519065

Yin, R. (2008). Case Study Research: Design and Methods. New York: SAGE.

ADDITIONAL READING

Fernandes, L., Simões, D., Pereira, C., & Moreira, A. C. (2019). Challenges of the internationalization strategy of a technology-based international new venture. In N. Teixeira, T. Costa, & I. Lisboa (Eds.), Handbook of Research on Entrepreneurship, Innovation, and Internalization (pp. 467–489). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-8479-7.ch018

Furtado, J., Pereira, A., Pereira, I., & Moreira, A. C. (2019). Does theory really fit real life situations?: A case study on the internationalization process of a technological service-based firm. In N. Teixeira, T. Costa, & I. Lisboa (Eds.), Handbook of Research on Entrepreneurship, Innovation, and Internationalization (pp. 419–438). Hershey, PA: IGI Global., doi:10.4018/978-1-5225-8479-7.ch016

Moreira, A. C., Ferreira, L., & Silva, P. (2018). Inward internationalization. Important challenges among SMEs. In R. Pérez-Uribe, C. Salcedo-Pérez, & D. Ocampo-Guzman (Eds.), Handbook of Research on Intrapreneurship and Organizational Sustainability in SMEs (pp. 250–275). Hershey, PA: IGI Global., doi:10.4018/978-1-5225-3543-0.ch012

Moreira, A. C., Ramos, M., Ferraz, L., & Martins, D. (2018). The internationalization process of a born global: A case study of a beverage firm. In O. Rua (Ed.), Entrepreneurial Orientation and Opportunities for Global Economic Growth (pp. 46–68). Hershey, PA: IGI Global., doi:10.4018/978-1-5225-6942-8.ch003

Moreira, A. C., Silva, P., Mota, J. H., & Gadim, H. (2019). De-internationalization of SMEs: A Case Study. In A. C. Moreira & P. Silva (Eds.), Handbook of Research on Corporate Restructuring and Globalization (pp. 143–169). Hershey, PA: IGI Global., doi:10.4018/978-1-5225-8906-8.ch007

Mota, J. H. & Moreira, A. C. (2017). Determinants of the capital structure of Portuguese firms with investments in Angola. *South African Journal of Economic and Management Sciences, 20*(1), a885. doi: . v20i1.885 doi:10.4102ajems

Ribau, C. P., Moreira, A. C., & Raposo, M. (2017). Export performance and the internationalisation of SMEs. *International Journal of Entrepreneurship and Small Business*, *30*(2), 214–240. doi:10.1504/IJESB.2017.081438

Ribau, C. P., Moreira, A. C., & Raposo, M. (2018). Categorising the internationalisation of SMEs with social network analysis. *International Journal of Entrepreneurship and Small Business*, *35*(1), 57–80. doi:10.1504/IJESB.2018.094264

Ribau, C. P., Moreira, A. C., & Raposo, M. (2018). Internacionalização de PME no Continente Americano: Revisão da Literatura. *Innovar (Universidad Nacional de Colombia)*, *28*(67), 59–73. doi:10.15446/innovar.v28n67.68613

KEY TERMS AND DEFINITIONS

Born Global: It is a type of company that from its inception seeks to derive a competitive advantage to compete in many countries. It normally pursues a vision of becoming global and globalizes rapidly without any preceding long term domestic or internationalization period or experience. Usually born globals are small, technology-oriented companies that operate in several international markets.

Born-Again Globals: They are characterized as being focused on the domestic market and suddenly being able to radically change their strategic focus in order to increase their sales volumes in international markets.

Case Study: It is a qualitative methodology, normally used in social sciences, that seeks to interpret a reality through a particular perspective. It is normally used to answer questions like "how" and "why." It is commonly used to addresses constructivist research processes.

Globalization: It is a worldwide movement toward economic, financial, trade, and communications integration. It is normally envisaged as a lack of trade barriers between nations, which are removed through free trade agreements throughout the world and between nation states. It implies the opening of local and nationalistic perspectives to a broader outlook of an interconnected and interdependent world with free transfer of capital, goods, and services across national frontiers, in which investment opportunities soar.

Internationalization: It is the process of increasing involvement of enterprises in international markets. It involves a strategy carried out by firms that decide to compete in foreign markets. It involves cross-border transactions of goods, services, or resources between two or more firms or organizations that belong to two different countries.

Internationalization Process: It involves the emphasis of a trajectory of a company in its transition from a national market to a particular foreign market. It normally involves several entry modes (exports, FDI, franchising, etc.) that exert a critical influence on the subsequent trajectory, as well as on cost related to the internationalization process. The two most important theories that explain the internationalization process are the Uppsala model and the network-based approach.

Uppsala Model: It has been one of the most discussed dynamic theories in Nordic School and International Business Studies. It explains the process of internationalization of companies. It explains how organizations learn and the impact of learning on the companies' international expansion. This theory defends that the companies' internationalization process is carried out in stages, from non-regular exports to the establishment of companies abroad.

Chapter 5
Seeking Opportunities:
Challenges Faced by a Small "Born Global" Company

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ABSTRACT

New types of companies have emerged, known as "Born Globals" (BGs), transitioning and internationalizing early and rapidly. They have attracted scholarly interest because their involvement in international sales from the moment of inception contradicts the more traditional perspectives on internationalization. This chapter explores a gap in the literature on BG micro-enterprises' behavior on their internationalization trajectory. It analyzes the case of a micro-company based in Aveiro, Portugal that follows a passive internationalization path to embrace a BG's typical behavior. The behavior of this micro-company is examined to illustrate how a BG can find new opportunities abroad and take advantage of them, the main entry modes and marketing strategies adopted in the early and rapid internationalization process, the importance of networking and growth strategies, and the role of the CEO in the internationalization process. This chapter adds value by explaining how a micro-enterprise manages to overcome its passive behavior and evolve into a BG company.

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INTRODUCTION

Businesses have evolved over time to adapt their international competitive behaviors to the external environment (Ietto-Gillies, 2012; Ribau et al., 2015). There have been several different frameworks, theories, interpretations and basic assumptions relating to globalization and growing international competition. The traditional Uppsala theory, which argues that a company internationalizes only slowly and gradually through the progressive accumulation of resources, knowledge and capabilities, has been called into question (Johanson & Vahlne, 2009; Maciejewski & Wach, 2019; Stanisauskaite & Kock, 2016). Several other models and theories of internationalization have been used to categorize companies, especially small and medium-sized enterprises (SMEs), according to their internationalization behavior.

With rapid internationalization, young, resource-constrained small companies, known as "born globals" (BGs), have emerged, exporting soon after their inception, entering both geographically and psychically distant markets, despite their limited resources and lack of organizational learning (Lopez, Kundu, & Ciravegna, 2008). This phenomenon goes against the assumptions of traditional theory, generating new perspectives on the behavior of companies.

In the literature on international entrepreneurship, Rennie (1993) first used the term "born global" to refer to companies that internationalize early and rapidly (Jones, Coviello, & Tang, 2011). However, similar new terms have emerged and are wrongly used as synonyms of BG, among which the term "International New Ventures" (INVs) stands out (Coviello, 2015). There is no clear definition of a BG company in the literature (Lopez et al., 2009). Another concept related to the rapid internationalization of SMEs is "born regionals" (BRs), which differ from BGs in the scope of their internationalization (Lopez et al., 2009). Despite the definitional problems, the widespread emergence of such companies around the world indicates that this is an important phenomenon that deserves further study (Knight & Cavusgil, 2004; Kraus et al., 2017).

Although other definitions of BGs have been suggested, in this chapter the definition of Knight et al. (2004) is used: exporting SMEs focused on a global niche market, with a specialized but narrow range of products, which internationalize up to three years after their inception, generating at least 25% of their total sales from foreign markets. There is no consensus about the percentage of foreign sales that a BG needs; and some authors mention the need to adapt the figure to the European reality, especially in small countries where it is easier to achieve a significant export rate.

All studies of this type of small and medium-sized companies assume that they have resource constraints (Hånell & Nordman, 2019), but that these do not prevent their founders from using their knowledge, experience and networking to enhance the internationalization process of their companies (Lopez et al., 2008; Maciejewski & Wach, 2019). The manager and / or founder plays an indispensable and dominant role in networking (Lopez et al., 2008; Maciejewski & Wach, 2019; Jones et al., 2011; Mort & Weerawardena, 2006; Englis & Wakkee, 2015), in strategy formulation (Jones et al., 2011; Knight, 2000; Knight & Cavusgil, 2004; Englis & Wakkee, 2015; Franco & Haase, 2016) and, consequently, in the rapid internationalization process. Studies show that companies with an international entrepreneurial orientation seek international markets by adopting risky, innovative and proactive behaviors that are essential for rapid internationalization (Mort & Weerawardena, 2006; Jones et al., 2011; Coviello, 2015; Maciejewski & Wach, 2019; Knight & Cavusgil, 2004). They use interorganizational networks to leverage their lack of internal resources (Lopez et al., 2008; Maciejewski & Wach, 2019; Hånell & Nordman, 2019; Sasi & Arenius, 2008; Coviello, 2006; Jones et al., 2011; Coviello & Munro, 1997; Mort & Weerawardena, 2006; Englis & Wakkee, 2015).

A literature review on BGs found many studies on the topic as it relates to SMEs and large firms (Maciejewski & Wach, 2019; Luostarinen & Gabrielsson, 2006), but there are still gaps, especially in relation to how resource-constrained micro-enterprises can successfully internationalize early in their development. Based on a case study of a micro-company, this chapter seeks to address the following research question: Can a resource-constrained micro-enterprise behave as a BG or is it just another micro-enterprise seeking the traditional internationalization path to survive in the international business arena? To answer this question, the following objectives are defined:

1. To analyze how this micro-company takes advantage of the globalization process and embraces opportunities in the international arena.
2. To analyze how this micro-company finds new opportunities in international markets.
3. To analyze if this micro-company follows an early and rapid internationalization path and what led the company to choose its growth strategy.
4. If this micro-company pursues early and rapid internationalization, to analyze the main determinants of the internationalization process and the extent to which the company can be considered a BG or a BR.
5. To analyze the determinants that motivated this rapid and early internationalization process.
6. To analyze the role of management and relational networks in the internationalization process.

After this introduction, this chapter presents a literature review based on the BG / BR concepts and the main factors that influence the internationalization process. The third section sets out the research methodology. The fourth section presents the case study and the fifth section discusses the results. Finally, the section six presents the main conclusions.

LITERATURE REVIEW

Born Globals and Born Regionals

Three types of companies are characterized by the fact that their internationalization process starts soon after their foundation: BGs, INVs and BRs. Although there are differences between BGs and INVs, most authors use the terms interchangeably (Cesinger, Danko, & Bouncken, 2012; Coviello, 2015; Maciejewski & Wach, 2019). For example, Rialp, Rialp, and Knight (2005) refer to INVs and BGs collectively as "early internationalizing firms", since both internationalize early and rapidly, focusing on niche markets, demonstrating flexibility in the mode of entry, and developing international networks. There is no single and precise definition of a BG in the literature (Lopez et al., 2009; Knight, Madsen, & Servais, 2004), although it is recognized that the term derives from the theory of entrepreneurship (i.e., looking for new solutions through new products and new markets) (Knight et al., 2004).

There are other similarities between BGs and INVs: they are normally innovative SMEs and they tend to look for global markets from the moment of their inception (Maciejewski & Wach, 2019; McDougall, Shane & Oviatt, 1994). They do not conform to traditional theories of gradual internationalization, such as the Uppsala theory (Jones et al., 2011; Ribau, Moreira, & Raposo, 2015). Both are also characterized by resource constraints and are usually founded by networking-oriented individuals who have previous international experience and have been involved in networking activities (Coviello, 2006; Hånell &

Nordman, 2019; Sasi & Arenius, 2008). The development of rapid and extensive networking facilitates the entry into multiple markets, and helps to overcome resource constraints (Andersson, Evers, & Gliga, 2018; Coviello, 2006; Coviello & Munro, 1997; Englis & Wakkee, 2015; Franco & Haase, 2016; Jones et al., 2011; Luostarinen & Gabrielsson, 2006; Maciejewski & Wach, 2019; Mort & Weerawardena, 2006; Sasi & Arenius, 2008). International experience is a critical intangible asset, positively influencing the internationalization of the company; the more internationally experienced managers are, the faster the internationalization of the firm (Kuivalainen et al., 2006).

Born Regionals (BRs) only differ from BGs in their geographical scope, as BRs operate in a more limited area, closer to their home markets (Lopez et al., 2009; Sui, Yu & Baum, 2012). However, both internationalize rapidly after their inception (Maciejewski & Wach, 2019).

The pattern of internationalization of these small companies contrasts with the traditional patterns in which companies operate in the domestic market for several years, and then gradually evolve into international markets, such as the Uppsala model (Ribau et al., 2015; 2018; Moreira, Ramos, Ferraz, & Martins, 2018; Fernandes et al., 2019). BGs operate in the global market from their earliest days, developing activities in domestic and international markets simultaneously (Franco & Haase, 2016; Kraus et al., 2017). In fact, BGs are usually companies for which the domestic market is of little relevance due to their small size, which pushes them to look for opportunities abroad. Moreover, in the case of European BGs, as their domestic market is small, looking for foreign markets is essential for rapid growth (Lopez et al., 2009). The notion of BGs was popularized by Knight and Cavusgil (2004), and their definition is the most widely adopted in the literature, although Coviello (2015) argued that the companies could best be referred to as “early internationalizers”, since there was no evidence that these companies were global, nor had they definitely aimed at internationalization at the time of their creation.

Despite their limited human, financial and tangible resources, BGs are grounded in innovation activities and in their knowledge-based ability to address international markets early on. While established companies have strong tangible resources that they use to leverage their success in international markets, BGs build on a unique set of intangible assets that are critical to their rapid and early internationalization process (Franco & Haase, 2016; Knight et al., 2004; Kraus et al., 2017). Marketing-related skills are very important, as they underpin international trade activities. A strong customer orientation and product differentiation help to improve the international performance of BGs.

To overcome their limitations, BGs tend to use personal and corporate networks to accelerate their internationalization process and gain knowledge and experience (Franco & Haase, 2016; Kraus et al., 2017; Maciejewski & Wach, 2019). The international mode of entry is mainly through exports, as resource constraints and the liability of smallness preclude other entry modes, especially foreign direct investment (Maciejewski & Wach, 2019). BGs face several challenges in international competition that multinationals do not, as they are more vulnerable and have fewer resources for their internationalization effort. These resource constraints are aggravated by high R&D costs that BGs cannot afford (Franco & Haase, 2016). Another feature of BGs is that they are able to penetrate markets that are both geographically and psychically distant, despite their limited resources (Lopez et al., 2009). As young companies, BGs do not have an established bureaucratic culture and they can operate in international markets, relying on managers with prior international experience, a global mindset and a greater propensity to take risks. As a result, BGs are more skillful and proactive in seeking international opportunities, based on a strong culture of innovation (Knight et al., 2004; Knight & Cavusgil, 2004).

BGs market highly specialized and innovative products, identifying opportunities in global niche markets (Knight & Cavusgil, 2004; Franco & Haase, 2016). They normally craft specialization strategies focused on very limited product ranges (Knight et al., 2004; Maciejewski & Wach, 2019). As their products require adaptation to specific customer needs (Hånell & Nordman, 2019) BGs usually follow a strategy based on product quality and differentiation.

Born Global, Internationalization Process

The traditional internationalization framework, known as the Uppsala Model, argues that internationalization is a slow, linear process in which companies go through several phases, and that internationalization only takes place after a period of maturity in the domestic market. This theoretical model assumes that resource acquisition requires both time and experience, in young and small SMEs. However, the behavior of BGs contradicts this model, as their internationalization process is early and rapid, supported by two main trends (Knight & Cavusgil, 2004): globalization of markets and consumer homogenization, which simplify product development and positioning in foreign markets; advances in information and communication technology, which facilitate international exchanges. The emergence of early internationalizers is a recent phenomenon, emerging worldwide in recent decades. It is not restricted to a specific country and has led to an evolution of traditional internationalization theory (Rialp et al., 2005; Ribau et al., 2015).

Although BGs usually rely on export activities, their international behavior cannot be seen as an isolated activity, as the growth of the company depends on it (Kuivalainen et al., 2006). In order to create strategic alliances, important facilitators of the internationalization process, SMEs must evolve in international markets (Franco & Haase, 2016). Internationalization helps BGs to achieve higher growth rates as their domestic market may be too small. This internationalization process involves various operations such as importing and subcontracting, as well as exporting, making a holistic learning process (Kuivalainen et al., 2006).

Some companies adopt a low risk approach, using local operators as distributors that are familiar with the overseas market. In these cases, strategic alliances are important modes of entry, with access to external opportunities that otherwise would not be accessible to these companies because of their limited resources (Franco & Haase, 2016; Li, Qian, & Qian, 2012). Although strategic alliances increase the competitiveness and sustainability of BGs (Franco & Haase, 2016), few SMEs establish joint ventures abroad, as this mode of entry is complex and requires both time and resources (Rodriguez, 2007). As there are costs associated with internationalization, such as intellectual property protection, companies need to consider their local and global strategies carefully in order not to compromise their development. The higher the perceived costs of relationships, the greater the pressure to choose direct modes of internationalization that do not involve cooperation with foreign agents (Maciejewski & Wach, 2019).

Two important factors influence market entry and exit of many SMEs in international markets (Rodriguez, 2007): strong international learning capacity and above average international experience. These two factors underpin a proactive international strategy (Franco & Haase, 2016). The internationalization process is seen as a learning process and not just a series of business operations, decisions and transactions that involve dealing with new types of customers who are located away from the corporate headquarters and may have different values and purchasing behaviors.

BGs create networks to grow their businesses rapidly, but because of this they may be subject to more risks (Kuivalainen et al, 2006). Maciejewski and Wach (2019) argue that internationalization is facilitated by inter-organizational and interpersonal relationships, which in turn require cooperation and mutual learning, and enable companies to expand rapidly.

Importance of Networks and Local Partners

SMEs increasingly use networking activities to accelerate their internationalization process (Andersson et al., 2018). Based on inter-organizational relationships, Johanson and Mattsson (2015) consider that internationalization depends on a set of relationship-based networks, and not on company-specific advantages. They argue that partnerships with external actors (i.e. customers, suppliers, competitors, and public or private entities) are important forces influencing internationalization. The use of partnerships allows companies to access knowledge, technologies, financial resources and foreign markets, and to overcome difficulties in marketing their products in international markets that arise from their limited experience and resources. BGs can use personal and corporate networks to overcome their limitations. Consequently, they take a proactive stance in finding new partners, thus recognizing the importance of alliances in order to take advantage of their competitiveness (Franco & Haase, 2016). By engaging in partnerships with larger companies, BGs can mitigate constraints arising from their size, and strengthen their R&D and marketing skills (Li et al., 2012). BGs can then focus more on R&D and the development of innovative products, resulting in permanent access to new knowledge and technology. They obtain greater market recognition for their products, mainly due to the credibility of being associated with their partners (Franco & Haase, 2016).

Since SMEs have few resources, it is important to establish good relationships with potential partners to exploit competitive advantages through their networks (Andersson et al., 2018). SMEs typically resort to business networks that are built throughout their internationalization process, to share and gain new knowledge and experience (Maciejewski & Wach, 2019) and compensate for their lack of market experience. Networks play a very important role in the rapid internationalization, knowledge intensive development and international market performance of BGs (Jones et al., 2011). Developing networks enables BGs to identify opportunities in global markets (Franco & Haase, 2016). Since most BGs lack material and financial resources, and depend on a limited product line, they look for partners that complement their competencies, to overcome the fragility of marketing a single product in foreign markets (Mort & Weerawardena, 2006; Franco & Haase, 2016). The trend toward increased globalization, coupled with technological change and stiff competition, has made strategic alliances more important in the global economy, forming an important part of international business strategy (Franco & Haase, 2016).

According to the network-based approach, international networks are created slowly, and companies must be committed to them and trust their partners (Sasi & Arenius, 2008). Managers' social networks also impact the company's internationalization process, which may involve the identification of a new market opportunities or the provision of important resources, and new information and knowledge about international practices (Andersson et al., 2018).

Englis and Wakkee (2015) concluded that the position that companies occupy in the network affects the process of recognizing opportunities, because of the related impact on the availability of information, time and references. Participation in a network is a source of information for entrepreneurs and CEOs about current market activities and developments. The entrepreneur or CEO has access to different information, depending on their position in the network. The position in the network also determines when the entrepreneur or CEO gets information and what opportunities can be identified and evaluated (Englis & Wakkee, 2015).

Networks also have a strong influence on both the market entry process and new country selection, as they allow the identification and exploration of new markets (Andersson et al., 2018; Bell & Cooper, 2015; Evers, & Gliga, 2018). They contribute to the identification of new market opportunities and the creation of knowledge about them (Mort & Weerawardena, 2006). The presence of SMEs in international networks is of great strategic importance, as new business opportunities arise among network members (Sasi & Arenius, 2008). The development of these networks also makes it possible to identify partners that complement the company's competences, thus enabling them to reduce the risks of marketing single products or niche products in foreign markets (Franco & Haase, 2016).

In short, network-based relationships are important means for companies and are useful for the acquisition, mobilization and development of organizational, human, financial and social capital throughout their international activities (Jones et al., 2011). However, Mort and Weerawardena (2006) claim that being involved in network-based activities restricts the company's strategic options, which is an inhibiting factor.

Importance of Previous Experience

The role played by the managers or by the CEOs of BGs is an important factor in the internationalization process. According to Hånell and Nordman (2019), BGs are usually founded by relationship-oriented individuals who, in their previous careers, have developed international experience and a strong network of contacts. Thus, due to the prior experience of their founders, BGs have the capability to acquire resources and knowledge to gain competitive advantage (Hånell & Nordman, 2019).

The founder's international experience affects the psychic distance perception to foreign markets and the degree to which this is seen as an internationalization barrier. Thus, entrepreneurs or CEOs with international experience have a well-developed contact network that supports early internationalization (Lopez et al., 2009). When managers occupy positions in international companies or abroad, they develop more open minded knowledge about international markets and new opportunities (Englis & Wakkee, 2015). Therefore, the role of the entrepreneurs or CEOs, their experience and their knowledge are key factors supporting the early, rapid and successful internationalization (Kraus et al., 2017).

Given the importance of newness and innovation in international markets it is mandatory that entrepreneurs and CEOs possess deep technological knowledge and skills (Franco & Haase, 2016). As they have the responsibility to implement business models, it is important that they focus on value creation activities so that the company improves its international performance (Kraus et al., 2017). It is also the entrepreneur's and CEO's responsibility to develop competitive strategies that differentiate the company from its competitors (Kraus et al., 2017).

Importance of Entrepreneurial Orientation

Jones et al. (2011) presented the concept of international entrepreneurship, which is a core behavioral concept involving entrepreneurial activities in several countries. The entrepreneurial mindset can be defined as the attitude of the company's founder towards internationalization (Englis & Wakkee, 2015).

According to Knight (2001), entrepreneurial orientation emphasizes innovation in the company's products and processes, risk propensity, and proactive behavior. Moreover, the attitudes and mindset of the company's founding team play a very important role in determining the extent to which companies engage in international activities (Englis & Wakkee, 2015). Thus, the entrepreneur's international orientation and the company's risk perceptions strongly influence the degree of internationalization (Jones et al., 2011). It is therefore important to consider the impact of the founders' knowledge and entrepreneurial capacity on the company's internationalization process, as this is crucial for the companies' success (Coviello, 2015).

Marketing Strategies of Born Globals

Because of lack of resources, BGs have to overcome several challenges, including the capability to market their products in world markets (Gabrielsson & Gabrielsson, 2008). As foreign markets are characterized by uncertainty and exogenous factors, it is important for resource-constrained companies to optimize their marketing interactions with the local environment (Knight, 2001). Thus, in addition to an entrepreneurial orientation, BGs are characterized by a strong international marketing orientation, which is reflected in their innovation and proactivity in seeking new markets (Knight & Cavusgil, 2004). Adapting products to external market conditions is a critical element, as it is important that they respond to the different needs of their customers (Knight, 2001).

BGs have a management mindset that emphasizes value creation through marketing activities, so that they can serve international customers and offer high added value products and services to customers that are more valuable than alternative offerings (Knight & Cavusgil, 2004). By adapting their marketing strategies, companies are able to respond more easily to changes brought about by globalization, and improve their performance (Knight, 2000). To penetrate international markets, it is important for BGs to select the countries where they want to expand, adapting their products/services and marketing strategies, or renewing their product/service portfolio (Gabrielsson & Gabrielsson, 2008).

According to Luostarinen and Gabrielsson (2006), BGs look for and serve global market niches because it is impossible for them to satisfy a large customer base. They also conclude that BGs prefer to serve niche markets, selecting B2B businesses rather than B2C businesses, as the former require fewer resources and require less focus on brand awareness. The focus on market niches also help BGs to define the R&D and marketing activities they need to invest in.

RESEARCH METHOD

Case Study Selection

In order to address the research question, a single case study was used, as it makes it possible to analyze real life situations, to combine previously developed theories with new specific results, to investigate phenomena in unique contexts, to analyze retrospective information and to develop new theoretical and practical insights (Eisenhardt, 1989; Ghauri, 2004). The internationalization of BGs, as micro-enterprises, is a complex process, and the case study method is well suited to analyzing a longitudinal perspective (Eisenhardt, 1989; Vissak & Francioni, 2013; Welch & Welch, 2009). The case study is an important research tool extensively used in management (Mariotto, Zanni & Moraes, 2014), to generate and test theory, but it also allows a more accurate perception of the circumstances in which a phenomenon occurs and can be used for both pedagogical and research purposes (Eisenhardt, 1989; Furtado et al., 2019; Mariotto et al., 2014; Gibbert, Ruigrok & Wicki, 2008).

This chapter focuses on a case study, following a qualitative analysis of a micro-enterprise based in Aveiro, Portugal, which in this study will be called VERTICAL. It was selected based on a judgmental / purposive sampling approach (Teddlie & Yu, 2007; Elo, Kanste, & Pölkki, 2014). The authors had previous knowledge of VERTICAL, and they realized that it could be considered a BG firm, as VERTICAL is a young, technology-based company with only three employees, and it exports most of its products. It was seven years old at the time of collecting information, having been founded in 2011 as a start-up, although its business activity only started in 2014. In addition, the CEO was willing to participate in a research project.

Data Collection and Analysis

A qualitative methodology was used to collect data. Two semi-structured interviews were conducted in May of 2019 with VERTICAL's CEO, who was chosen because he had been part of the company's staff since its inception and had the knowledge to provide the most reliable information. As well as having knowledge regarding the company's growth strategy, activity, and financial indicators, he also had an evolutionary perspective on the company. The interviews lasted approximately 30 minutes each. Both were recorded in audio format. Subsequently, in order to ensure the conformity of the results and facilitate further analysis of the data, the interviews were transcribed. The second interview complemented the first and helped the researchers to confirm and validate the content of the first interview, and also to seek further elaboration on key points.

The initial interview was structured around the topic of research, i.e. the company's internationalization and its behavior as a BG. Previous knowledge of the company was used to tailor the script to the specific context of the company. The interview guide covered questions relating to eight key topics: (1) company information, about the evolution of its initial market objectives, main team, sales volume, competitive positioning and strategic changes; (2) internationalization activities, strategies and processes; (3) participation in export programs; (4) product / service sales strategy; (5) subsidiaries; (6) relationships with suppliers, customers and competitors; (7) mode of internationalization and key success factors.

Visiting the production facilities was important for the interviewers to familiarize themselves with the different products and the environment in the unit, improving the researchers' understanding of the company and products. During the visit it was possible to meet one of the employees working in the technical department, who described the company's facilities and explained thoroughly VERTICAL's sales process. The researchers' impressions of the visit were attached to the summary of the interviews.

The interviews and the complementary visit allowed the researchers to analyze managerial actions regarding the internationalization of activities. All the interviews took place at VERTICAL's facilities, so the researchers could observe events in their natural setting, rather than relying on pre-arranged single interviews. The researchers maintained a passive and unobtrusive presence, in order not to interfere with on-going events and activities. Data from all sources were collected and transcribed into a single case story, helping to identify missing information.

Primary data collection was then complemented with secondary data collection, which involved obtaining material from public sources, such as the website of the firm, marketing information and multiple observations. Obtaining complementary information from different sources was important to ensure the validity and reliability of data (Gibbert et al., 2008; Ghauri, 2004; Mariotto et al., 2014).

With the data from the interviews and other sources it was possible to build an evolutionary image of the company that is reliable and close to reality. In addition, data analysis and data triangulation resulted in a series of unique characteristics and behaviors that allowed the researchers to compare case-specific data with the theory gathered in the literature review.

Finally, a summary table was developed, which is included at the end of the chapter. This table assists comparison between observations and theory, and also summarizes the discussion of the results comprehensively and clearly.

CASE STUDY PRESENTATION

Company History

Founded in 2011, VERTICAL started its business with a single patented product – PLTS, acronym for People Lifting and Translation System – and six employees. VERTICAL was founded by Mr. Manoel. The current CEO joined in as partner with marketing responsibilities and focused mainly on internationalization processes, trying to open foreign markets in the construction industry, where the PLTS could be employed. Mr. Manoel was already the owner of a Brazilian company specializing in working at height, created in 2002 and focusing mainly on the construction industry, but the company was in need of new equipment. In 2010, as a result of safety and productivity problems in the construction industry, this Brazilian company came up with the innovative idea, but could not develop it. Thus, VERTICAL was born with the objective of developing high-tech equipment and marketing it, as well as creating new solutions for working at height. The innovative PLTS product was created and soon afterwards patented. As a result of a company turnaround, Mr. Manoel stepped out, and VERTICAL was taken over by its current CEO with the support of external investment.

Between 2011 and 2013 VERTICAL focused on product development, patenting and bureaucratic work, and there was no sales activity. In 2013, VERTICAL was formally registered as a company. A factory was set up in the district of Santarém, Portugal, which is currently being decommissioned, although it was active until 2018. VERTICAL does not currently produce any components in-house, as is dedicated to mounting the system and providing services. The company is currently located in Aveiro, Portugal. The relocation of facilities to Aveiro was also related to the fact that Santarém has a limited business environment, with few resources, people, suppliers and partners. Moreover, the CEO and another employee were originally from Aveiro, which influenced the decision to relocate. VERTICAL is a young, dynamic and flexible company with a strong customer focus, concerned with the development of solutions that meet the needs of its customers.

The company's activity began in January 2014, when the current CEO joined VERTICAL on a full time basis. Between 2013 and 2014, VERTICAL managed to certify product quality, produce catalogs, design a website and establish several partnerships. By 2016, the company, to compensate for its limited resources, typical of micro-companies, actively participated in several competitions, having earned some awards for its innovative activities. Currently, VERTICAL is dedicated to the development of new products/services, having launched three new products in 2019. In 2018, the company's turnover reached around 300,000 euros.

Mission, vision, values and objectives

VERTICAL's mission is to develop simple yet effective equipment that is both safe and productive for working at height. The three main pillars of this company are safety, productivity and innovation. Innovation is undoubtedly one of VERTICAL's competitive advantages, given that it was created to develop new equipment. Safety is also critical, as the main downstream business sector is construction, an industry with high occupational accident rates. Sustainability and social responsibility are also important values that govern the company's operations. The CEO claims he is concerned about using environmentally friendly materials in the manufacture of PLTS.

The company focuses on the development of new projects with innovative technologies that can solve problems that are emerging in working at height. The main need the company wishes to address is the risk and low productivity associated with working at height. According to the CEO, about 40% of a worker's day is lost to the resettlement of their life-lines and other safety issues. Therefore, VERTICAL's value proposition is (a) a 40% reduction in cleaning and maintenance costs, and (b) social inclusion, as PLTS enables the employment of handicapped individuals.

Organizational structure

VERTICAL is a micro-company with only three employees. It is currently looking for a fourth employee to join the sales team. Being a micro-company, it relies heavily on technical partners who collaborate temporarily with the company in certain areas. Partnerships with universities mean that an intern is currently part of the team, but this cannot solve structural problems. The CEO is responsible for both the financial and marketing functions of the company. VERTICAL also has a technical department.

Product and service portfolio

PLTS is innovative equipment that allows work to be performed at heights of up to 120m with both horizontal and vertical movement. A worker can reach any part of a structure/building using a single harness and a remote control. Its innovative design also allows anyone, including the physically disabled or paraplegic individuals to carry out vertical work safely and efficiently. PLTS is versatile as it fits any structure, whether a building, bridge, oil rig or wind tower. This patented technology enables safer, faster work, as it takes only six seconds to reach a height of 120m. It also makes work cheaper, as it increases the productivity of work at height. PLTS is still considered the safest lifting system in the world, consisting of seven mechanisms. Of these, the lifting system is based on the first winch in the world that lifts people using a single harness, i.e. without the need for safety baskets. This replaces the use of more conventional methods such as scaffolding, lifting platforms and ropes.

PLTS is VERTICAL's core product. However, it has several models, which have a total of 13 different applications, of which the following stand out: *PLTS no limits*, which allows horizontal and vertical movements, using a simple harness, initially designed for the construction industry, but can be used in maintenance services, such as cleaning exterior or interior glass; *PLTS freedom*, which is most suitable for elevators; *PLTS4two*, which combines *PLTS no limits* with a basket (which allows the transportation of heavy loads such as stones, windows or glass) and a distance limiting bar; *PLTS wind* for the repair of wind power towers; *PLTS home*, designed to be installed in homes or hospitals, to allow quick access to multiple rooms without the use of a wheelchair; and *PLTS deep*, suitable for accessing mines. However, the interview with the representative of the company's technical department revealed that only *PLTS no limits* is currently for sale, and that it meets European standards and has European certification. In addition to PLTS, the company also sells accessories, which are developed by its R&D team. These are mainly equipment to make the work more practical and safer.

In terms of services, VERTICAL has created the PLTS Academy, a program, integrated into its strategy, to train and certify individuals, including the disabled and amputees, and other companies to install and use the PLTS technology and products. When the PLTS system is sold, at least one VERTICAL representative, accompanied by a team that is subcontracted in Portugal or in the destination market, must supervise the installation of the product on site. A representative of VERTICAL must be physically present wherever the PLTS service is being provided.

Market and competitors

VERTICAL was created to meet the needs of markets in different industries: construction, renewable energy, services and maintenance for vertical structures, and tourism. The company's target is mainly maintenance companies in those sectors. VERTICAL is a company that works in the B2B segment. The company was established to develop the necessary parts and equipment for which there was not yet an offer in those markets. The two main industries that the company is dealing with are the construction and renewable energy sectors, as the company also develops internal elevators for wind energy turbines.

The main competitors are predominantly international companies. There is no manufacturer of similar equipment at national level. For example, one competitor, TRACTEL, a multinational company, provides lift and maintenance equipment, suspended work platforms, and fall arrest systems in more than 120 countries, featuring similar products to those sold by VERTICAL, or that can replace them.

RESULTS

Internationalization Strategy

International activity, through exports, was developed at the same time as domestic activity from 2014 onward, three years after its creation as a startup. VERTICAL was founded with an international orientation, mainly as a result of the nature of the product, because of the limited domestic market for the product in Portugal. The CEO thinks that VERTICAL could not be profitable if it was entirely dependent on the domestic market. Hence the drive for internationalization, through exports, has been constant from the beginning. The CEO, who was initially responsible for the commercial area, focused on finding new markets in the construction industry that could be suitable for VERTICAL's products. He claims that VERTICAL was created mainly to serve foreign markets, and so was "born international".

In its early years, the company followed a strategy that lacked structure and objectivity. The efforts to internationalize involved attempts to enter as many markets as possible, which proved not to be the best approach. The company then decided to change its strategy. Currently, VERTICAL follows a geographical-based strategy, investing, at the same time, in the creation and development of relations with strategic clients. That allows VERTICAL to conserve its energy and retain customers, distributing up-to-date information about the company and its portfolio, and gathering information about potential future projects from its customers.

The growth strategy was a low risk one, entailing the use of local operators (distributors), who were very familiar with the local market and were responsible for product sales in their area. Later, and as a consequence of the geographical refocusing and dropping local intermediaries, the firm's growth strategy changed to what is currently practiced. These changes were directly related to changes in the company's management structure, entailing a focus on a limited number of markets, with a higher associated value. They were also related to the weaknesses of distributors, in promoting and selling the product.

Nowadays, exports are made using a direct sales approach, and the main destination markets are located in North Africa, the Middle East, and Europe. In terms of sales, the firm trades with a wide variety of countries, scattered globally, such as Singapore, Brazil, Spain, and Saudi Arabia. The quantity of exports to each country is highly variable. In general, as stated by the CEO, the European market comprises 50% of the operations, the Middle Eastern between 20% and 30%, and the rest to the African market. Notwithstanding the direct sales approach, VERTICAL makes some effort to establish local partnerships in target markets, mainly to ensure technical and commercial support; however VERTICAL retains overall responsibility for all projects. On the whole, the strategic adjustment explained above arises from the need to adapt early strategic choices, i.e. the use of intermediaries, which, according to the CEO, were a failure because the local operators were not able to sell the product. Finally, and equally important, are the company's export percentages, which, since 2014, have been higher than 30%.

Selection of Foreign Markets

VERTICAL started by selecting markets that were supposedly culturally closer to Portugal, namely Angola. Some factors influenced this choice, making it easier for VERTICAL to enter this market. First of all, VERTICAL already had some Angolan market knowledge. Secondly, Angola's official language is Portuguese and lastly, several Angolan companies have relationships with Portugal. However, the CEO realized that businesses are conducted differently in both countries.

Gradually, VERTICAL selected more geographically and culturally distant markets, as the construction companies mentioned earlier also started to conduct businesses in those markets. All in all, VERTICAL did not have considerable knowledge about the foreign markets to which it internationalized. Therefore, foreign market selection resulted largely either from market potential or the presence of the aforementioned Portuguese construction companies. In short, it was VERTICAL's network that influenced decisively the choice of the various foreign markets.

The main obstacle in VERTICAL's internationalization relates to the delivery of products to foreign markets, especially due to transportation and logistics issues. In fact, VERTICAL needs to be physically present at the construction site where the PLTS is going to be applied, as the company is responsible for its on-site installation.

Importance of Networks

VERTICAL's main entry strategy into foreign markets is through the establishment of informal agreements with some of the best known Portuguese construction companies, namely Teixeira Duarte, Martifer and Soares da Costa. VERTICAL's objective is to be subcontracted by these companies that conduct businesses all over the world. The established informal relationships allow VERTICAL to conduct businesses in the same countries as those companies, according to the CEO. These informal agreements are crucial to VERTICAL's internationalization strategy and arise from the so-called "informal network" of the CEO. This network comprises both personal and professional contacts established by the CEO during the time he worked in the sector, for over six years.

In VERTICAL's destination markets, the company works closely with a network of local partners, mainly for logistical issues. They also provide help concerning installation, provision and customer service. This local network of partners is an integral part of VERTICAL's approach to international markets as the company relies heavily on them. Local partners are selected through online searches, or are recommended by local clients.

Role of Innovation in Internationalization: R&D Activities

According to the company's CEO, in 2018 investment in R&D corresponded to 30% of the current sales volume. As VERTICAL is a young company, in order to satisfy new market needs, it tries to develop new products and improve the existing ones. Since innovation relies on markets, it is not associated with faster internationalization. The CEO explains that, in the Middle East, there is a demand for technologically innovative products, which helped VERTICAL's market entry. In contrast with that, the functionality of the product is more important than technological innovation in the African market. In foreign markets, VERTICAL was not a pioneer, since other large companies, such as TRACTEL, already operated there.

Role of the CEO in Internationalization: Networking and Previous Experience

The CEO acknowledges that his previous experience, gained from his previous work in this industry, allowed him to build a network of contacts, crucial to VERTICAL's internationalization. His professional and personal contacts with various companies in the construction industry enable VERTICAL's CEO to identify which partners have projects in certain foreign markets. With these contacts, the company is able to overcome its resource constraints. The company's CEO also states that his network contacts are a cost-effective way to communicate and advertise the products in international markets. These informal contacts are essential to obtain resources and to accelerate the internationalization process.

The CEO also had previous experience in internationalization activities, which facilitated VERTICAL's internationalization process. He believes that without this experience the company would have to spend more time and resources. In conclusion, the CEO is a key-factor in the company's internationalization process, since he defines and coordinates all operations. As mentioned before, the previous management team tried, wrongly, to accelerate the internationalization process by having a presence in all foreign markets and having various local distributors. However, with a new CEO and new strategies, the company spent fewer resources and focused on the most profitable markets. Since the target customers are not active on social media, the company had to adapt their style of communication.

Marketing Strategy

The company has adapted its market and effort concentration over time in relation to the resource-contained perspective. Initially, VERTICAL focused on social media since it was a low cost approach. However, given the standard product base of this particular company for B2B markets, the initial marketing strategy failed and was changed. VERTICAL started to focus on the customer. The CEO understood that social media networks were irrelevant to the target customers, bringing no advantages to the company. This was possible because of changes in the management team and international policy and strategy (concentration of foreign markets). In tandem with that, international distributors were also identified. Several contracts were signed and several companies paid VERTICAL royalties to sell PLTS in specific markets. The CEO points out that this was a wrong strategy, because distributors were unable to make sales, as they were not companies particularly committed to products like PLTS.

As VERTICAL operates in niche markets with standard products, the market approach is very important for a successful outcome. This is achieved through being close to the customers, and is mainly achieved through participation in international trade fairs, distributing and mailing catalogs and personalized information about products that may be of interest to certain customers. In other words, product advertising strategies and contact with target customers include catalogs and flyers, complemented with disseminating product information through the website. Sending customers information is crucial in the internationalization process. Establishing branches abroad will be necessary in the future, as some local partners have already approached VERTICAL to discuss that possibility.

DISCUSSION

Marketing Strategy and Customer Orientation

The CEO considers that the marketing strategy followed by VERTICAL is crucial to the success of the business. It changed over time as a result of a customer-centered approach (from a focus on low cost social media to a standard product base for B2B markets). VERTICAL increasingly focused on its customers. The CEO understood that social media networks were not relevant to the target customers, and had no advantages for the company. As Knight (2001) argued, resource-constrained companies must approach their customers through marketing activities, product adaptation and channels that optimize their interactions. Gabrielsson and Gabrielsson (2008) state that, due to their lack of resources, BGs have to overcome several challenges and must advertise their products in global markets, which can be difficult.

The results show that VERTICAL is a customer-oriented company, focusing on a close and mutual learning approach, seeking to create long-term and stable relationships. The company was able to build customer loyalty by sending up-to-date information about the company and products, realizing which projects customers are involved in and pursuing them. As argued in the literature, the company was able to adapt products to foreign market conditions and create customer value (Knight, 2001; Knight & Cavusgil, 2004). Since VERTICAL had few resources in the early stages of its internalization process, this case study confirms the importance of focusing on a narrow set of clients (Luostarien & Gabrielsson, 2006), especially as VERTICAL is a micro-enterprise competing in international markets.

Internationalization Strategy

Founded with an international orientation, notwithstanding its domestic activity, VERTICAL's case confirms the importance of both international and domestic markets in the rapid and early internationalization process (Franco & Haase, 2016; Kraus et al., 2017). It confirms that the search for foreign markets is almost a requirement for such a company's growth (Lopez et al., 2008): a "borderless" vision of markets, which prompts companies to develop international marketing strategies immediately after their creation, usually within three years of their inception (Coviello, 2015; Knight et al., 2004).

Since VERTICAL exports more than 30% of its product, it can be considered a BG (Knight et al., 2004). VERTICAL's export entry mode in foreign markets is shaped by its lack of resources and its small size. As described in the literature, VERTICAL focuses on a global niche market (Knight & Cavusgil, 2004; Franco & Haase, 2016; Luostarinen & Gabrielsson, 2006) and on the commercialization of a narrow range of products (Knight et al., 2004; Maciejewski & Wach, 2019), namely equipment for working at height, in the maintenance of enterprises in the construction and renewable energy sectors.

Regarding market selection, VERTICAL started to internationalize in Angola, as it is culturally and linguistically close to Portugal. Gradually, the firm internationalized in the Middle East. The destination choice of the company's international process is not proactive, since it merely follows its partners to markets already chosen by them, which can be described as “follower” behavior. Leveraging its network, VERTICAL has internationalized to several European countries. Although BGs are portrayed as having proactive behavior in the search for international opportunities (Knight, Madsen, & Servais, 2004), the firm can be considered to be closer to a BG than to a BR, due to its wide geographical scope (Kraus et al., 2017). However, the behavior of this micro-company is passive, in contrast to the claims of theoretical studies (Knight et al., 2004; Ribau et al., 2018), using personal and business networks to mitigate the lack of both resources and international knowledge.

Another aspect that positions VERTICAL as a BG is the fact that it invests a lot in R&D, corresponding to about 30% of sales volume. With its innovation culture functioning as an antecedent of early internationalization (Knight & Cavusgil, 2004), VERTICAL displays a typical behavior of BGs.

Relationship Networks and Informal Partnerships

Initially, VERTICAL focused on formal agreements, establishing strategic alliances with local distributors. However, over time this strategy changed, as VERTICAL realized the importance of informal agreements and partnerships. VERTICAL’s internationalization process has been strongly influenced by the CEO and his informal network, which comprises both inter-organizational and interpersonal relationships. VERTICAL’s main concern is to develop its networks in order to expand its business quickly, using local partnerships and informal agreements (Maciejewski & Wach, 2019). VERTICAL’s internationalization process currently depends on a set of networks, which are of critical importance to the company. They influence its rapid internationalization, as has been suggested by Johanson and Mattsson (2015) and Li, Qian, and Qian (2012).

Due to its limited resources, BGs usually rely on different types of networks, which allow them to access new knowledge and resources. Networks also speed up the internationalization process of BGs, by helping these companies enter many markets at the same time, and overcome resource constraints (Andersson et al., 2018; Coviello, 2006; Englis & Wakkee, 2015; Franco & Haase, 2016; Jones et al., 2011; Maciejewski & Wach, 2019; Mort & Weerawardena, 2006; Sasi & Arenius, 2008). The “informal networking” carried out by the current CEO and the relationships established with local companies to provide additional services, enabled VERTICAL to gain knowledge and international experience, and have helped the company to overcome its constraints, and supported the internationalization process.

Role of Management: Culture, Previous Experience and Entrepreneurial Capacity

The role of VERTICAL’s CEO, who had prior international experience and a global mindset, has been very important throughout the internationalization process, since he coordinates and defines the company’s strategies. With the resignation of VERTICAL’s founder, its management, and consequently its internationalization and marketing strategies, changed. When developing new strategies, the CEO embraces ideas that support the company’s international success. In addition, the CEO’s previous experience makes it possible to draw on a network of personal and professional contacts that were crucial to VERTICAL’s rapid internationalization. Based on Hånell and Nordman (2019) arguments, VERTICAL can be classified as a BG. As argued by Franco and Haase (2016), CEO’s previous international experience has allowed him to develop entrepreneurial skills, a global mindset and greater risk propensity. In its emphasis on product and process innovation, VERTICAL demonstrates an entrepreneurial orientation, as suggested by Knight (2001). VERTICAL has a passive market orientation – following some Portuguese client companies that purchased their products – which differs from the typical proactivity of BGs. However, this can be explained by the company's resource limitations and network-based relationships, which are used as a way to find opportunities in international markets.

VERTICAL: A Born Global or The Typical Traditional Slowly and Gradually Internationalizing Company?

Taking all of the results in the round – the decision to internationalize, the timing of internationalization, the mode of international market entry, sales volume and percentage of sales abroad, type of products, main markets, marketing strategy, CEO's previous experience, networking activities, role of local partners, and R&D activities – it is time to address the research question as to whether VERTICAL is a BG or whether it follows the traditional Uppsala theory that most micro-companies follow. As there have been few studies of micro-enterprises behaving as BGs, this company is an interesting case study that contributes to theoretical studies in this field. The data collected, gathered and analyzed is shown in Table 1.

Table 1. Summary of main topics covered in relation to VERTICAL

Main Topics	VERTICAL
Beginning of international activities	Three years after its inception as a start-up and one year after being considered a company.
Why the decision to internationalize?	Due to the product's nature (lack of application in the Portuguese market) and the domestic market reduced dimension.
Mode of Entry	Export, through direct sales.
Pattern of internationalization	Early and rapid. The company was "born international", so its international activity was developed simultaneously with the domestic market.
Company size	A micro-enterprise with three full time employees
% of total foreign sales	Larger than 30% of sales volume
Type of product	Innovative, technology-based product for a very specific market segment (PLTS). It is used mainly in the construction industry. It is normally adapted to each project in which is incorporated.
How does VERTICAL select international markets?	Market choice is typically passive. It depends on the presence of other Portuguese construction companies, with whom VERTICAL has informal agreements. Complementarily, there is a proactive marked seeking behavior, namely the search for new partners and projects. Normally, the geographical and psychological distance is not taken into account.
How does geographical enlargement happen?	Initially, the company chose countries with similar language and culture (e.g. Angola). This was followed by a progressive expansion to unknown countries, entering markets in different locations.
How does VERTICAL detect new opportunities?	Mainly through social networks with Portuguese companies from the construction industry.
Internationalization strategy	Although the company's strategy changed, VERTICAL always had an international mindset. In order to be involved in international activities, the company relies on networks.
Main markets	Northern Africa, Middle East, Europe (the latter corresponds to 50% of its operations).
Role of local partners	Very important. They provide technical and commercial support that is crucial to the company's international activities.
Role of established agreements	Informal agreements with Portuguese companies in the construction sector are essential to the company's internationalization.

continues on following page

Table 1. Continued

Main Topics	VERTICAL
Marketing strategy	The firm operates in the B2B market. The communication is supported through the creation of brand awareness in international trade fairs, catalogs and personal information. Strong customer orientation. Cooperation with clients supports product customization.
CEO's previous experience	Very relevant. It underpinned the relational-based strategy that supported the lack of resources of the firm in the internationalization process. Previous experience in international markets supported the CEO in crafting the internationalization strategy circumventing the lack of previous experience/knowledge.
Investment in R&D	Very significant: 30% of sale volume.

The key features of BGs identified in the literature are: (a) early beginning of international activity; (b) entry modes, internationalization purpose and patterns; (c) company size; (d) percentage of sales in foreign markets; (e) type of product; (f) market selection and international expansion; (g) detection of internationalization and marketing opportunities and strategies; (h) main markets; and (i) the importance of local partners and establishing agreements. These features are taken mainly from the definition of BG proposed by Rennie (1993) and Knight and Cavusgil (2004). VERTICAL's market selection and international expansion is unusual, because it follows its partners to their chosen foreign markets, and the company's market entry is passive, as it allows its network to lead it to foreign markets. However, there is a more proactive approach when the company is looking for business opportunities, and the distance between VERTICAL and its destination markets does not restrain its choices. In this proactive approach, and on most of the other indicators that typify BGs, this micro-company behaves as a typical BG.

With respect to market expansion, initially VERTICAL's priorities were countries with similar language and culture, followed by a progressive expansion to distant countries. However, the market expansion resulted from the initial network of contacts and not from the experience obtained in international markets. It is possible to conclude that distance (geographic and psychic) is not a constraint in choosing markets. In this, VERTICAL's behavior is closer to that of a BG than a BR.

CONCLUSION

This chapter addresses a research question – Can a resource-constrained micro-enterprise behave as a BG or is it just another micro-enterprise seeking the traditional internationalization path to survive in the international business arena? – and in so doing addresses a less researched topic involving early internationalization of micro-companies and six objectives defined in the introduction section. After the discussion presented in the previous section, this section summarizes the main outcomes of the study.

The case study analysis suggests that the globalization process forced the company to change its strategies to meet the needs of global markets. A similar change of mind may have led many entrepreneurs to steer their SMEs to behave as BGs. However, micro-enterprises are not covered in the literature on BGs, and a study in this area is of particular added value to managers who, through their proactivity and dynamism, seek to exploit the internal resources of their companies and complement them through the practice of international relationships. Such tactics have allowed some companies to attain a global perspective.

It was possible to associate, to a great extent, the behavior and actions of VERTICAL with what is described in the literature as the typical behavior of BGs. As BGs start their internationalization process rapidly and early, and are constrained in both human and financial resources, it is important that they resort to networking activities. These networks allow access to new knowledge and resources, thus enabling BGs to enter new markets abroad more easily. The creation of personal and business networks with international partners through the use of cooperative strategies was an enabler for VERTICAL, a Portuguese micro-enterprise, when it internationalized using its follower behavior.

The role of entrepreneurs and CEOs is also very important in internationalization, as their previous experience and skills acquired in the internationalization process make it possible to develop an international mindset. Through their personal and professional networks and previous experience, entrepreneurs and CEOs have the ability to analyze opportunities in overseas markets, thus enabling companies to be successful abroad. The attitude of the founders and CEOs of BGs towards internationalization is also a factor influencing the success of international activities.

When entering international markets BGs need to adapt their product portfolio and marketing strategies to serve different markets with different needs. Since micro-enterprises have limited resources, it is important for them to be close to their clients in order to adapt to their clients' specific needs. Moreover, servicing niche markets is important to keep the micro-company focused.

VERTICAL entered the market with an innovative technology-based product, with little application in the Portuguese market. Although the company has already developed an international orientation, it was also necessary to look for international markets where the product could be marketed.

One can conclude that the main determinants of VERTICAL's early and rapid internationalization process were the CEO and the relationship networks he has been building over time. The CEO also played a leading role in choosing and formulating VERTICAL's internationalization strategy. The growth strategy was chosen to compensate for a lack of resources and the small domestic market for the product.

Two aspects deserve more elaboration. Taking into account the existing literature on BGs, and taking the definition provided by Knight, Madsen, and Servais (2004), one can claim that VERTICAL is a micro born global company. However, if one takes into account VERTICAL's passive behavior, and its strategy of following its clients into markets, and thereby developing a successful international strategy, VERTICAL could be a born regional company if its clients operated in countries closer to Portugal. Those who use the number of foreign markets serviced as a metric to distinguish between born regional and born global may have a relevant point. Future studies might examine this point further.

Another important aspect is how to evaluate the "follow the client" strategy that VERTICAL has been successfully implementing. As BGs are normally supposed to follow active internationalization strategies, based on international entrepreneurship theory, it might be argued that following the leader is not the prototypical, proactive strategy that one expects from a BG. However, if one takes into account the scarcity of available resources that micro-enterprises experience, which could only be overcome by leveraging networking activities and knowledge generated by the CEO in previous and current managerial positions, one can argue that this strategic behavior represents exactly the kind of imaginative, entrepreneurial and proactive solution to the resource restriction problem that one would think of as typical of BGs. It is the type of opportunity seeking behavior managers/CEOs need to have to succeed in international markets. Despite the apparently "passive" behavior, one can nevertheless argue that VERTICAL follows a risk-averse strategy relying on its networks to exploit opportunities overseas.

Finally, this chapter complements the literature on BGs involving micro-companies implementing creative ways to embrace international markets. More research is needed involving resource-constrained micro-enterprises competing in the international arena. Such research would be of added value to complement previous knowledge of SMEs and large companies.

REFERENCES

Andersson, S., Evers, N., & Gliga, G. (2018). Entrepreneurial marketing and born global internationalization in China. *Qualitative Market Research*, *21*(2), 202–231. doi:10.1108/QMR-11-2016-0115

Bell, V., & Cooper, S. (2015). Acquisition of knowledge in networking for internationalisation. In A. Groen, G. Cook, & P. van der Sijde (Eds.), New technology-based firms in the new millennium (vol. 11, pp. 29–53). Bingley: Emerald. doi:10.1108/S1876-022820150000011010

Cesinger, B., Danko, A., & Bouncken, R. (2012). Born globals: (almost) 20 years of research and still not 'grown up'? *International Journal of Entrepreneurship and Small Business*, *15*(2), 171–190. doi:10.1504/IJESB.2012.045203

Coviello, E. N. (2006). The network dynamics of international new ventures. *Journal of International Business Studies*, *37*(5), 713–731. doi:10.1057/palgrave.jibs.8400219

Coviello, N. (2015). Re-thinking research on born globals. *Journal of International Business Studies*, *46*(1), 17–26. doi:10.1057/jibs.2014.59

Coviello, N., & Munro, H. (1997). Network relationships and the internationalisation process of small software firms. *International Business Review*, *6*(4), 361–386. doi:10.1016/S0969-5931(97)00010-3

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550. doi:10.5465/amr.1989.4308385

Elo, S., Kääriäinen, M., Kanste, O. I., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE Open*, *4*(1), 1–10. doi:10.1177/2158244014522633

Englis, P. D., & Wakkee, I. (2015). Managerial mindset and the born global firm. In A. Groen, G. Cook, & P. van der Sijde (Eds.), New technology-based firms in the new millennium, (vol. 11, pp. 9–17). Bingley: Emerald. doi:10.1108/S1876-022820150000011009

Fernandes, L., Simões, D., Pereira, C., & Moreira, A. C. (2019). Challenges of the internationalization strategy of a technology-based international new venture. In N. Teixeira, T. Costa, & i. Lisboa (Eds.), Handbook of Research on Entrepreneurship, Innovation, and Internalization (pp. 467-489). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-8479-7.ch018

Franco, M., & Haase, H. (2016). Internationalisation of born globals: The role of strategic alliances. *European Journal of International Management*, *10*(2), 181–201. doi:10.1504/EJIM.2016.074471

Furtado, J., Pereira, A., Pereira, I., & Moreira, A. C. (2019). Does theory really fit real life situations?: A case study on the internationalization process of a technological service-based firm. In N. Teixeira, T. Costa, & I. Lisboa (Eds.), Handbook of research on entrepreneurship, innovation, and internationalization (pp. 419–438). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-8479-7.ch016

Gabrielsson, M., & Gabrielsson, P. (2008). Global marketing strategies of born globals and globalising internationals in the ICT field. *Journal of Euromarketing*, *12*(3/4), 123–145.

Ghauri, P. (2004). Designing and conducting case studies in international business research. In R. Marschan-Piekkari & C. Welch (Eds.), *Handbook of qualitative research methods for international business* (pp. 109–124). Edward Elgar. doi:10.4337/9781781954331.00019

Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic Management Journal*, *29*(13), 1465–1474. doi:10.1002mj.722

Hånell, M. S., & Nordman, R. (2019). What geographical scope works best for rapidly internationalizing SMEs? *Journal of Business and Industrial Marketing*, *34*(6), 1194–1202. doi:10.1108/JBIM-11-2017-0299

Johanson, J., & Mattsson, L. G. (2015). Internationalisation in Industrial Systems — A Network Approach. In M. Forsgren, U. Holm, & J., Johanson (Eds.), Knowledge, networks and power (pp. 111–132). London: Palgrave Macmillan.

Johanson, J., & Vahlne, J. E. (2009). The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership. *Journal of International Business Studies*, *40*(9), 1411–1431. doi:10.1057/jibs.2009.24

Jones, M. V., Coviello, N., & Tang, Y. K. (2011). International entrepreneurship research (1989–2009): A domain ontology and thematic analysis. *Journal of Business Venturing*, *26*(6), 632–659. doi:10.1016/j.jbusvent.2011.04.001

Knight, G. (2000). Entrepreneurship and marketing strategy: The SME under globalization. *Journal of International Marketing*, *8*(2), 12–32. doi:10.1509/jimk.8.2.12.19620

Knight, G. (2001). Entrepreneurship and strategy in the international SME. *Journal of International Management*, *7*(3), 155–171. doi:10.1016/S1075-4253(01)00042-4

Knight, G., & Cavusgil, S. (2004). Innovation, organizational capabilities, and the born-global firm. *Journal of International Business Studies*, *35*, 24–41.

Knight, G., Madsen, T. K., & Servais, P. (2004). An inquiry into born-global firms in Europe and the USA. *International Marketing Review*, *21*(6), 645–665. doi:10.1108/02651330410568060

Kraus, S., Brem, A., Schuessler, M., Schussler, F., & Niemand, T. (2017). Innovative born globals: Investigating the influence of their business models on international performance. *International Journal of Innovation Management*, *21*(1), 1–54. doi:10.1142/S1363919617500050

Kuivalainen, O., Lindqvist, J., Saarenketo, S., & Äijö, T. (2006). International growth of Finnish software firms: Starting points, pathways and outcomes. *Journal of Euromarketing*, *16*(1/2), 7–22.

Li, L., Qian, G., & Qian, Z. (2012). Early internationalization and performance of small high-tech "born-globals". *International Marketing Review*, *29*(5), 536–561. doi:10.1108/02651331211260377

Lopez, L., Kundu, S., & Ciravegna, L. (2009). Born global or born regional? Evidence from an exploratory study in the Costa Rican software industry. *Journal of International Business Studies*, *40*(7), 1228–1238. doi:10.1057/jibs.2008.69

Luostarinen, R., & Gabrielsson, M. (2006). Globalization and marketing strategies of Born Globals in SMOPECs. *Thunderbird International Business Review*, *48*(6), 773–801. doi:10.1002/tie.20122

Maciejewski, M., & Wach, K. (2019). International startups from Poland: Born global or born regional? *Journal of Management and Business Administration*. *Central Europe*, *27*(1), 60–83.

Mariotto, F., Zanni, P., & Moraes, G. (2014). What is the use of a single-case study in management research? *Revista de Administração de Empresas*, *54*(4), 358–369. doi:10.1590/S0034-759020140402

McDougall, P., Shane, S., & Oviatt, B. (1994). Explaining the formation of international new ventures: The limits of theories from international business research. *Journal of Business Venturing*, *9*(6), 469–487. doi:10.1016/0883-9026(94)90017-5

Moreira, A. C., Ramos, M., Ferraz, L., & Martins, D. (2018). The internationalization process of a born global: A case study of a beverage firm. In O. Rua (Ed.), *Entrepreneurial orientation and opportunities for global economic growth* (pp. 46–68). IGI Global. doi:10.4018/978-1-5225-6942-8.ch003

Mort, G. S., & Weerawardena, J. (2006). Networking capability and international entrepreneurship - How networks functions in Australian born global firms. *International Marketing Review*, *23*(5), 549–572. doi:10.1108/02651330610703445

Rennie, W. R. (1993). Global competitiveness: Born global. *The McKinsey Quarterly*, *4*, 45–52.

Rialp, A., Rialp, J., & Knight, G. A. (2005). The phenomenon of early internationalizing firms: What do we know after a decade (1993–2003) of scientific inquiry? *International Business Review*, *14*(2), 147–166. doi:10.1016/j.ibusrev.2004.04.006

Ribau, C. P., Moreira, A. C., & Raposo, M. (2015). Internationalisation of the firm theories: A shematic synthesis. *International Journal of Business and Globalisation*, *15*(4), 528–554. doi:10.1504/IJBG.2015.072535

Ribau, C. P., Moreira, A. C., & Raposo, M. (2018). SME internationalization research: Mapping the state of the art. *Canadian Journal of Administrative Sciences*, *35*(2), 280–303. doi:10.1002/cjas.1419

Sasi, V., & Arenius, P. (2008). International new ventures and social networks: Advantage or liability? *European Management Journal*, *26*(6), 400–411. doi:10.1016/j.emj.2008.09.008

Stanisauskaite, V., & Kock, S. (2016). The dynamic development of international entrepreneurial networks. In H. Etemad, S. Denicolai, B. Hagen, & A. Zucchella (Eds.), *The changing global economy and its impact on international entrepreneurship* (pp. 119–135). Edward Elgar. doi:10.4337/9781783479849.00012

Sui, S., Yu, Z., & Baum, M. (2012). Prevalence and longitudinal trends of early internationalisation patterns among Canadian SMEs. *International Marketing Review*, *29*(5), 519–535. doi:10.1108/02651331211260368

Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research*, *1*(1), 77–100. doi:10.1177/1558689806292430

Vissak, T., & Francioni, B. (2013). Serial nonlinear internationalization in practice: A case study. *International Business Review*, *22*(6), 951–962. doi:10.1016/j.ibusrev.2013.01.010

ADDITIONAL READING

Mota, J. H. & Moreira, A. C. (2017). Determinants of the capital structure of Portuguese firms with investments in Angola. *South African Journal of Economic and Management Sciences, 20*(1), a885. doi: . v20i1.885 doi:10.4102ajems

Ribau, C. P., Moreira, A. C., & Raposo, M. (2017a). SMEs innovation capabilities and export performance: An entrepreneurial orientation view. *Journal of Business Economics and Management*, *18*(5), 920–934. doi:10.3846/16111699.2017.1352534

Ribau, C. P., Moreira, A. C., & Raposo, M. (2017b). Export performance and the internationalisation of SMEs. *International Journal of Entrepreneurship and Small Business*, *30*(2), 214–240. doi:10.1504/IJESB.2017.081438

Ribau, C. P., Moreira, A. C., & Raposo, M. (2018). Categorising the internationalisation of SMEs with social network analysis. *International Journal of Entrepreneurship and Small Business*, *35*(1), 57–80. doi:10.1504/IJESB.2018.094264

Ribau, C. P., Moreira, A. C., & Raposo, M. (2019). The role of exploitative and exploratory innovation in export performance: An analysis of plastics industry SMEs. *European Journal of International Management*, *13*(2), 224–246. doi:10.1504/EJIM.2019.098149

KEY TERMS AND DEFINITIONS

Born Global: It is a type of company that, from its inception, seeks to compete in many countries. It normally pursues a vision of becoming global and globalizes rapidly without any preceding long term domestic or internationalization period or experience. Usually born globals are small, technology-oriented companies that operate in several international markets.

Case Study: It is a qualitative methodology, normally used in social sciences, that seeks to interpret a reality through a particular perspective. It is normally used to answer questions like "how" and "why." It is commonly used to address constructivist research processes.

Globalization: It is a worldwide movement toward economic, financial, trade, and communications integration. It is normally envisaged as a lack of trade barriers between nations, which are removed through free trade agreements throughout the world and between nation states. It implies the opening of local and nationalistic perspectives to a broader outlook of an interconnected and interdependent world with free transfer of capital, goods, and services across national frontiers, in which investment opportunities soar.

International New Venture: it is a business organization that, from inception, seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries.

Internationalization: It is the process of increasing involvement of enterprises in international markets. It involves a strategy carried out by firms that decide to compete in foreign markets. It involves cross-border transactions of goods, services, or resources between two or more firms or organizations that belong to two different countries.

Internationalization Process: It involves the emphasis of a trajectory of a company in its transition from a national market to a particular foreign market. It normally involves several entry modes (exports, FDI, franchising, etc.) that exert a critical influence on the subsequent trajectory, as well as on cost related to the internationalization process. The two most important theories that explain the internationalization process are the Uppsala model and the network-based approach.

Uppsala Model: It has been one of the most discussed dynamic theories in Nordic School and International Business Studies. It explains the process of internationalization of companies. It explains how organizations learn and the impact of learning on the companies' international expansion. This theory defends that the companies' internationalization process is carried out in stages, from non-regular exports to the establishment of companies abroad.

Chapter 6
Entering a Brave New World:
Market Entry Assessments Into a Born Global Industry

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ABSTRACT

This chapter investigates key motivations, drivers, and barriers for firms that are seeking to enter new international supply chains for renewable energy. Offshore wind (OW) is a born global industry with a fully internationalized supply chain from inception. The study adopts a mixed-methods approach by first doing 11 case studies of Norwegian industrial companies entering OW and secondly by conducting an online survey targeting the whole population of Norwegian firms in OW. The study finds that new green industries' distinctive features, managerial motivation, and industry relatedness shape a firm's entry strategies and behavior. Risk and uncertainty, complexity and turbulence, high transaction costs and disadvantages of scale postpone industry entry from established actors. The study finds that environmental motivation tops the list of motivations for managers to enter, but financial motivation is the strongest of perceived market performance. Finally, the study finds that market relatedness is more critical than technological relatedness.

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INTRODUCTION

Global energy value chains are in transition. To stay on the course outlined by the Paris Agreement and to limit the global temperature increase to 1.5°C, we need a rapid and extensive transition towards renewable energy (IPCC, 2019). In many parts of the world, renewable energy is currently outcompeting and outgrowing hydrocarbons as the main source of energy. New global value chains based on renewable energy are emerging, and entry into those multi-billion-dollar global supply chains represents significant opportunities for firms that seek new business and are willing to take on the associated risk.

From a scholarly point of view, these new renewable industries are interesting for several reasons. One is related to the fact that they are based on ‘green’ innovations that arguably outcompete old solutions on costs, and simultaneously contribute to a better society and to a healthier planet. To outcompete and replace old solutions with new and greener solutions is a game we need to master well in the future, if we are to reach the goals set by the Paris Agreement. Another reason to study emerging renewable energy industries is that they are fully internationalized from inception (Bjørgum, Moen, & Madsen, 2013; Løvdal & Aspelund, 2012). This means that any actor - new or old, domestic or foreign – need to fend of international competition for any contract or license in order to succeed in the industry. In addition to fierce international competition, actors also need to deal with typical liabilities of immature markets, such as high levels of risk and uncertainty and market inefficiencies due to high transaction costs.

This chapter investigates key motivations, drivers, and barriers for firms that are seeking to enter international supply chains for renewable energy. More specifically, it investigates how top managers perceive these business opportunities in terms of underlying motivation for industry entry, the role of technological and market relatedness, and relevant emerging market characteristics that shape strategic international market entry behavior into energy supply chains in transition.

The offshore wind (OW) industry is an appropriate case industry to investigate these factors. It is emerging as one of the most competitive energy sources in Europe – outcompeting energy production based on hydrocarbon fuels such as coal, oil and gas. It is an industry that is fully internationalized from inception – a Born Global industry – where all contracts and licenses are subject to international competition. It is also an emerging industry, which is now only reaching its growth phase and where it is possible to investigate how entering firms have dealt with the immature characteristics of the market.

Since one of the main aspects of the study is to look at international entry, it made sense to study Norwegian firms’ entry into OW. There is no domestic market for OW in Norway, so all entries from Norwegian companies into OW are inherently international. Furthermore, the Norwegian OW industry is especially interesting to investigate since Norway’s economy is largely based on the oil & gas industry, meaning that OW firms must compete with oil & gas companies for financing and support.

This chapter provides theoretical insight into emerging green and renewable global industries by focusing on the Norwegian OW industry. The chapter then goes on to present the methods of the study. Finally, results are presented and discussed in relation to theoretical and practical implications.

THEORETICAL BACKGROUND

As mentioned previously, if we are to fulfill the goals of the Paris Agreement and keep global warming under 1.5 degrees Celsius, many of the current energy- and resource-demanding supply chains need to be replaced with more sustainable solutions (IPCC, 2019). One of the major culprits for CO^2 emissions is the energy sector that accounts for approximately one third of global greenhouse gas emissions (Davis, Caldeira, & Matthews, 2010). It is very unlikely that it is possible to meet the goals of the Paris Agreement without an energy transition to renewables. However, this is challenging.

In general, green innovations face at least two competitive liabilities. The first refers to the phenomenon that Klaus Rennings (2000) labeled as the double externality problem. Rennings observed that eco-innovations, by definition, deliver value in three dimensions. First, they deliver value to nature as they either reduce the use of resources that are taken from nature, or they reduce emissions or pollutions that result from the process of production and consumption. Second, eco-innovations deliver value to human society by taking better care of humans or the environment they are embedded in. Finally, eco-innovations deliver value to the firms that take them to market. The double externality problem states that firms can normally only capture value from the latter, and consequently, income might not be sufficient to offset the costs. Hence, even though an innovation may be able to provide great value for nature and society it might fail to materialize because the innovative firm lacks the financial incentives from the market to see the project through.

The double externality problem is plainly visible in the renewables sector. A transition to renewables would have great value for nature. Especially, because it could potentially reduce climate change and slow loss of biodiversity. Moreover, it would provide significant value to society as health concerns related to pollution could be significantly reduced. Still, the income firms can make from selling renewable energy solutions most often does not offset the costs. Hence, many valuable eco-innovations remain unrealized unless they are state-sponsored or assisted in the marketplace through other types of regulation.

In capital-intensive industries such as OW, the double externality problem is even more pronounced. This is because the only way to become cost-efficient in OW is to build large-scale pilot wind parks and invest heavily in R&D and new and efficient production facilities and infrastructure. Combined with the inherited risk and uncertainty of such a process, it is hard to attract capital from institutional investors.

The latter effect introduces the second competitive liability that faces new renewable energy industries, namely the typical characteristics of new industries. Ever since Thomas S. Kuhn (1962) introduced the theory of scientific revolutions there has been awareness among innovation scholars that industries in early stages have some particular characteristics that mature industries do not have. Some of these characteristics were identified early in the seminal work of Raymond Vernon (1966) on product life cycles. Much has changed since Vernon's work, but research that is more recent confirms the particularities of new industry characteristics, and place these into four categories (Aldrich & Fiol, 1994; Christensen & Raynor, 2013; Forbes & Kirsch, 2011; Klepper & Graddy, 1990; Möller & Svahn, 2009). New industries typically have:

- **High levels of uncertainty and risk**. Some of this risk can be mitigated or probabilities can be calculated based on experience from other similar industries, but often it is pure uncertainty. High levels of risk and uncertainty have certainly been present in OW. Some risk factors, such as operational performance, could be calculated from onshore wind, but other factors such as political support schemes and long-term costs have been truly uncertain.
- **Complexity and turbulence**. Innovation literature, and especially population ecology, has shown that in early phases of industry evolution there are great varieties in technical solutions, business models and contractual arrangements. As competition sets in and dominant designs of technical solutions, business models and contracts are selected, industry turbulence follows (Gustafsson, Jääskeläinen, Maula, & Uotila, 2015). This is also a trait that has been observed in OW (Dedecca,

Hakvoort, & Ortt, 2016). For example, from the industry start in early 2000, when the industry constituted primarily of independent start-ups, until today when OW is predominantly driven by large multinationals.

- **High transaction costs.** Evolutionary economics shows that transaction costs are typically very high in early phases of industry evolution, and that they consistently drop as the industry approaches maturity (Jacobides & Winter, 2005). Again, this is a recognizable trait of the OW industry. In early phases, specialized suppliers for key activities such as sea-bottom surveys, weather data, installation vessels, offshore foundations, etc. were lacking. Transaction costs of identifying actors that could fulfill these roles, selecting technical solutions, agreeing on contracts, and other control mechanisms were high in comparison to similar industries such as offshore oil & gas.
- Finally, new industries typically suffer from competitive liabilities due to **disadvantages of scale and immature/untested solutions.** Arguably, new renewables, such as OW, need to outcompete energy solutions that have been developed and refined over decades and where the accumulated R&D investments have reached extensive levels.

The four factors above represent liabilities of most new industries, which represent barriers to entry for any firm. In addition to these, OW can be categorized as a Born Global industry (Aspelund, Azari, Aglen, & Graff, 2017; Løvdal & Aspelund, 2012). New entrants to Born Global industries face an additional set of challenges because internationalization happens in earlier phases of industry evolution than suggested in the product life cycle models (Vernon, 1966, 1979). This means that firms must deal with the complexities of international trade, including handling cultural and political risk in a market setting which is unknown. This study seeks to investigate how firms overcome these liabilities.

Given the inherent liabilities of green and new industries, it is also of primary interest to understand the motivations for entering them. Motivation is what drives us to voluntary actions that are goal directed (Latham & Pinder, 2005). It helps to determine direction (what to do), effort (how hard to do it), and persistence (how long to do it) (Mitchell, 1982). As such, motivation is often studied because it can help to predict behavior and outcomes associated with behavior. A common element of motivation theories is that motivation can be separated into intrinsic and extrinsic types of motivation (Porter & Lawler, 1968; Ryan & Deci, 2000, 2017; Vroom, 1964). Intrinsic motivation means that motivation stems from interest, enjoyment and satisfaction inherent in the activities themselves, while extrinsic motivation requires that actions are taken to achieve some separable consequences that can result from the actions (Gagné & Deci, 2005).

This study, which deals with the motivation for firms to enter a green industry, is primarily interested in extrinsic types of motivations as these are most easily attributed to the organizational level. A relevant framework to investigate this is found in Bansal and Roth (2000), which provides a motivation framework for companies' environmental initiatives that includes three primary motives for companies who pursue green initiatives - environmental motivation, competitiveness (i.e., financial) motivation, and legitimacy motivation. These categories reflect the primary reasons that firms desire to be in environmentally-friendly business activities, including financial reasons like competitive advantage and long-term profitability (financial motivation), social and ecological reasons stemming from a care for the environment (environmental motivation), and obligation, image-related, and stakeholder reasons associated with regulations, norms, values, or beliefs (legitimacy motivation). Of these categories of motivation, environmental and financial motivation are proactive strategies while legitimacy is more of a reactive or imitative strategy since it involves companies' efforts to comply with norms and regulations. Furthermore, these three types of motivation are predicted to have various outcomes, such as higher profits (financial motivation), survival (legitimacy motivation), and employee morale (environmental motivation). This study seeks to investigate firms' primary motivations for entering OW, and their potential associations with perceived market performance.

To enter a new industry is not only a matter of motivation, but also a strategic assessment of how existing resources can be leveraged in a new market and what new resources and capabilities need to be developed in order to become competitive. These questions are frequently discussed in the strategic management literature that deals with diversification. According to Ansoff (1957) diversification is *"a simultaneous departure from the present product line and the present market structure"*. This means that firms enter an unfamiliar market or industry with a new or modified product or service, which represent a growth strategy with high risk.

Related diversification is when existing and new business units share certain key characteristics (Helfat & Eisenhardt, 2004), which gives potential for synergistic benefits as critical resources can be shared among business units (Barney, 1991). Several studies have shown that related diversification leads to better firm performance than doing business in only one industry or diversifying into unrelated industries (see e.g. Palich, Cardinal, & Miller, 2000), even if it means accepting higher levels of risk. However, the ability to turn diversification into profits is dependent of how related the new industry is. Hence, to what extent are the diversifying firms able to leverage existing market and technological resources and capabilities in the new industry?

Relatedness can be defined between firms or industries, but from a firm perspective, it is most useful to address relatedness between business units (Pehrsson, 2006). Resources, such as knowledge, skills and technologies, are commonly used as a basis for explaining how related a firm's business units are. If resources are somewhat related, then bundling processes, marketing effects, products and so on can create mutually reinforcing effects between different units of a firm (Barney, 1991). Hence, many firms make diversification decisions based on what resources they possess and the importance of these resources in the new market. Furthermore, Lieberman et. al. (2017), found that related diversification leads to lower transaction costs, which again lowers entry and exit barriers. Hence, an additional benefit is then that firms diversifying into related industries more easily can readjust or reallocate their resources if one of the businesses or industries are struggling.

Related diversification can arise at different points along a firm's value chain, potentially creating synergy effects, related to different resource bases such as marketing, sales, product and technology. This implies that relatedness is a multidimensional concept (Pehrsson, 2006) and a valid measure of relatedness should capture synergy potentials in both technological activities and market associated activities (Nocker, Bowen, Stadler, & Matzler, 2016).

In summary, previous research has found that there are at least two major market specific challenges related to new renewable industry entry. The first is the double externality problem, which is a general challenge in all new 'green' industries, and the second is related to market characteristics associated with Born Global industries. In addition, previous research has found that motivation and relatedness influence the strategic assessment of new market entry. This study analyses how these market specific challenges, motivation and relatedness influence market assessment and strategic behavior of firms that seek entry into a renewable Born Global industry.

METHODS

Norwegian Offshore Wind Industry

In order to study market entry into emerging industries the energy sector was chosen because it is under transition in order to fulfil future requirements for a sustainable energy mix. As part of this process, new industries based on renewables are emerging that can contribute to those goals. Within renewables, offshore wind (OW) is rising as one of the new key energy sources in Europe and elsewhere. The OW industry has taken this position over the time span of little more than a decade. According to WindEurope – an association for the industry – costs per installed capacity fell by almost 50 percent between 2015 and 2018, which has contributed to its competitiveness.

Certainly, the cost of power production varies with natural conditions, but the cost reductions that happened in this time period leaves OW as one of the most competitive in Europe when located near to where there is access to relatively shallow waters and wind. Consequently, the International Energy Agency (IEA) predicts that OW will be the dominant source of power production in Europe by 2042.

The OW industry has been created by resource and knowledge input from multiple countries and with fully internationalized supply chains from the start (Bjørgum et al., 2013). Hence, it is a Born Global industry (Løvdal & Aspelund, 2010, 2012). This study investigates the underlying rationale for market entry into OW from Norwegian firms or international firms that operate in OW from Norway. The focus on Norwegian companies is justified due to the lack of a home market for OW in Norway. The Norwegian government has so far not supported OW licenses as the country has ample access to cheap hydropower, suitable locations for onshore wind, and few locations with shallow waters fit for OW. Hence, all entries into OW from Norwegian firms are international, and Norwegian firms cannot use OW specific resources to gain contracts abroad. What Norway does have though, is an internationally competitive energy sector (hydropower and offshore petroleum) with a competence profile that fits OW. Hence, many firms, both new and established, seek entry into OW for growth in new markets where they can leverage current energy and maritime expertise.

Case Studies

The study adopted a mixed methods approach. First, a total of 11 case studies were conducted on Norwegian industrial companies that had entered the industry. To select relevant case companies, we used the 4C Offshore Database (www.4coffshore.com) to identify all Norwegian companies that had activities in the OW industry at the time of the interviews. Furthermore, we wanted a mix of both new and established firms, and a mix in terms of size and time of entry into the OW industry. Table 1 below provides a short description of the case companies. Since some of the information may be sensitive in terms of competition, the firms have been anonymized. The case studies were performed in 2017 in two waves. The first wave predominantly focused on market entry issues and characteristics of emerging international industries. The second wave of case studies predominantly focused on issues related to diversification, relatedness and leverage of existing resources and capabilities. Both waves included questions related to motivation for entry. All cases were built from interviews with top management and archival data analysis from public online sources.

Table 1. Description of case companies

Company	General description	Role in OW
A	Large offshore oil service company with considerable activity in the North Sea	Entered OW in 2010 and has been growing consistently. Currently holding orders for billions of NOK in OW
B	Large specialized OW company established in 2008 with primarily international sales.	Specializes on installation and maintenance
C	Small maritime service company with world-wide operations	Entered OW in 2016 predominantly to exploit over-capacity of equipment due to the downturn in the oil sector
D	Small specialized OW company established in 2004. Based on technology from the offshore oil sector.	Delivers substructure concepts. First OW contract in 2006.
E	Small specialized OW company established in 2007. Based on technology from the offshore oil sector.	Delivers substructure concepts. First OW contract in 2015.
F	Medium-sized ship design and ship builder company with international activities.	Delivers ship design and ships targeting OW installation and maintenance. Started to follow OW in 2009 but entered in 2014.
G	Large global energy company with primary activities in offshore petroleum	Entered OW in 2005 and has since become one of the globally leading project developers and owners.
H	Medium-sized Norwegian engineering company with a broad range of services globally. Heavily embedded in the offshore petroleum sector.	Entered OW in 2016, predominantly delivering IT and monitoring solutions.
I	Medium-sized analytics and forecast provider. Global operations.	Entered OW in 2007 and has been responsible for many OW analytics and forecast projects
J	Large engineering and manufacturing company with international operations. Long time exposure for both offshore petroleum and hydropower sectors.	Entered OW in 2007. Mainly designing and manufacturing substructures for OW.
K	Large foreign controlled multinational engineering and manufacturing company. Delivers infrastructure for all power sectors	Entered OW in 2001 and has since become one of the leading suppliers in OW.

Survey

Second, an online survey was conducted targeting the whole population of Norwegian firms that were active in OW. Companies were identified from previous studies of the industry (Hansen & Steen, 2015; Steen & Hansen, 2014), from the 4C Offshore Database (www.4coffshore.com) and from the member list of the Norwegian energy industry association (www.norwep.com). The output from these three data sources was merged and double entries removed. Furthermore, bankrupt or dissolved companies, state-owned enterprises, non-profit organizations, universities, municipalities, and research institutes were removed since the study only focused on active for-profit companies.

Additionally, since only companies with sales of tangible services and products and a specific focus on the offshore wind industry (at home and/or abroad) were of interest, then regional electricity companies/grid owners were also removed. Finally, in consultation with several industry experts, 11 firms were added because they had not been originally included on the company list. These were typically firms that had entered OW very recently. The selection procedure resulted in 163 companies in total.

The research group developed a questionnaire that was tested with a focus group of practitioners to make sure that the questions were comprehensible and answerable. The survey was written in Norwegian and included questions related to the firms' current engagement in OW, risk assessments and investment criteria for the OW industry, diversification and relatedness to activities in other industries, engagement with governmental support schemes, and perceived market performance.

Over a 3-month period, (February 1 to May 1 in 2018), the 163 identified Norwegian offshore wind companies were given the opportunity to respond to the online survey. The 10-page online questionnaire was sent to a representative contact (i.e., CEOs or managers who had enough knowledge to respond to the survey questions on behalf of their company) in each of the companies using the survey software program Select Survey. Individual respondents and their respective companies were guaranteed confidentiality, and they were also ensured that collected survey data would only be presented and/or published in aggregate form to prevent the possibility of individual identification. Over the 3-month time period, companies were followed-up by phone and email to increase the response rate. Ultimately, we received 97 usable survey responses out of a possible 163, resulting in a response rate of 60 percent. Based on visual inspection of sample characteristics and a comparison of respondents to non-respondents, there were no clear differences present. Moreover, with a high response rate and no obvious sources of selection bias, it is reasonable to assume that the sample is a good representation of the total population of Norwegian firms in the OW industry.

The sample comprises a diverse range of firms with differences in core businesses, firm size and age, and engagement in OW. The sample includes 13 companies that define OW as their core business. 22 companies defined the maritime sector as their core business, 32 oil & gas, and 12 consulting or engineering. In addition, there were 18 firms that fell outside the predefined categories. These firms typically identified themselves within manufacturing, onshore renewables, energy, or environment solutions. This means that most firms in the sample have most of their activities outside OW. More specifically, 86 of the 97 companies deliver products or services outside of the OW industry, and only 15 firms had more than 25 full-time equivalents specific to OW. When it comes to ownership, 56 of the companies were fully Norwegian owned, 25 were Norwegian controlled multinational companies (MNCs) and 16 were foreign controlled MNCs.

The sample also represents a broad range of different suppliers to OW. Figure 1 shows the variety of products and services that are offered from the Norwegian firms in the sample.

Most responding firms (51) were established before 2000, a total of 25 firms were established between 2000 to 2009, and the remaining 21 firms from 2010 and after. This means that the sample mostly consists of well-established firms. This is in contrast to a very early study of offshore renewables, which found that in 2005, firms in the industry almost exclusively consisted of new independent start-ups (Løvdal & Aspelund, 2012). Obviously, as the industry has matured, larger companies have moved in to take positions.

Figure 2 shows the revenues from the OW sector, while Figure 3 below shows the distribution of firm size. These figures illustrate that most of the firms in the sample are small and medium sized enterprises (SMEs) and only 20 firms are classified as large firms (more than 250 employees). Regarding revenues, the data shows that for many firms, income from OW is quite limited. In 2017, most firms in this sample had less than 5 percent of total revenues from OW and only 11 firms had more than NOK 100 million (equivalent to about 10 million EUR) from OW. This shows that for most firms, OW is currently only a side business with limited financial effect.

Figure 1. Products or services to OW

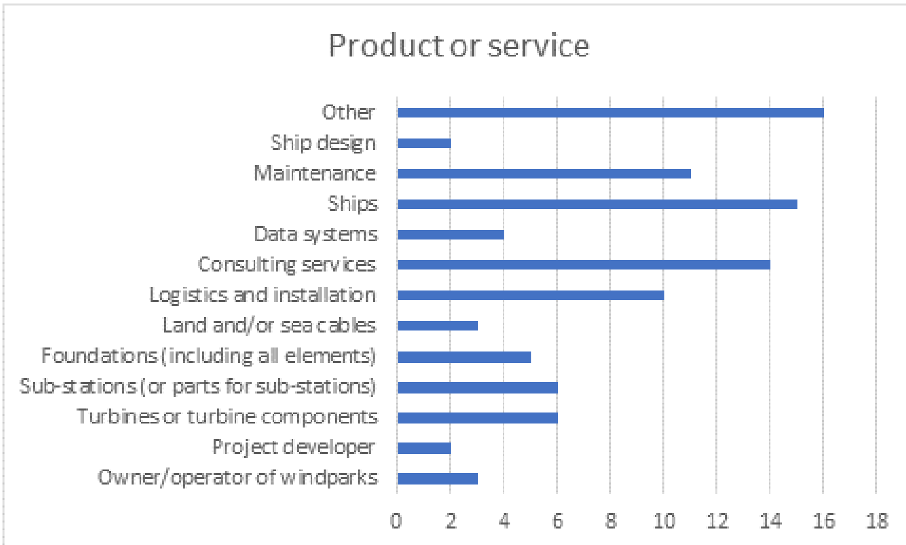
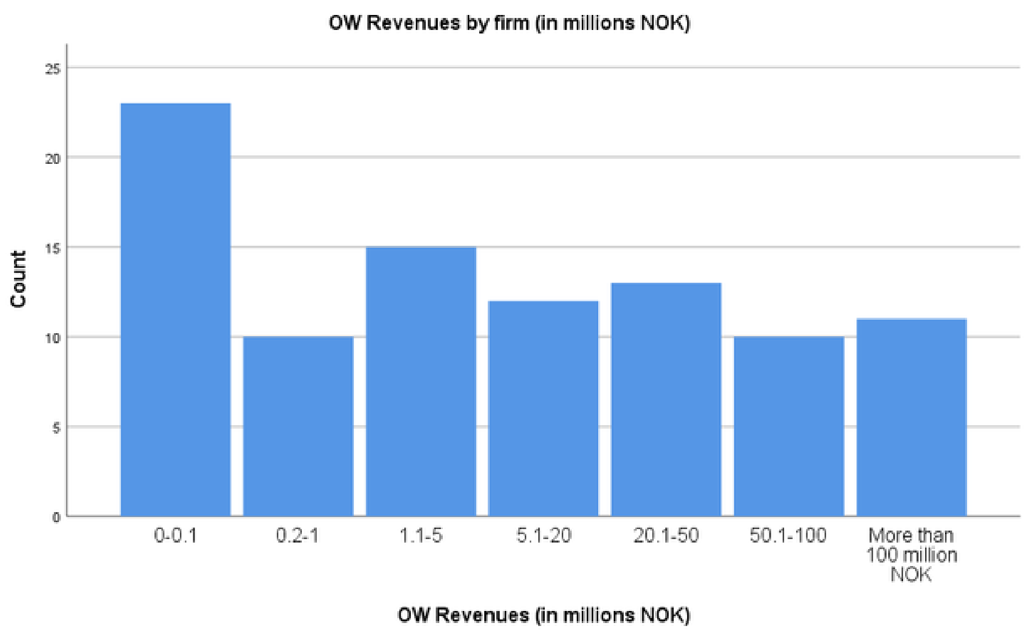
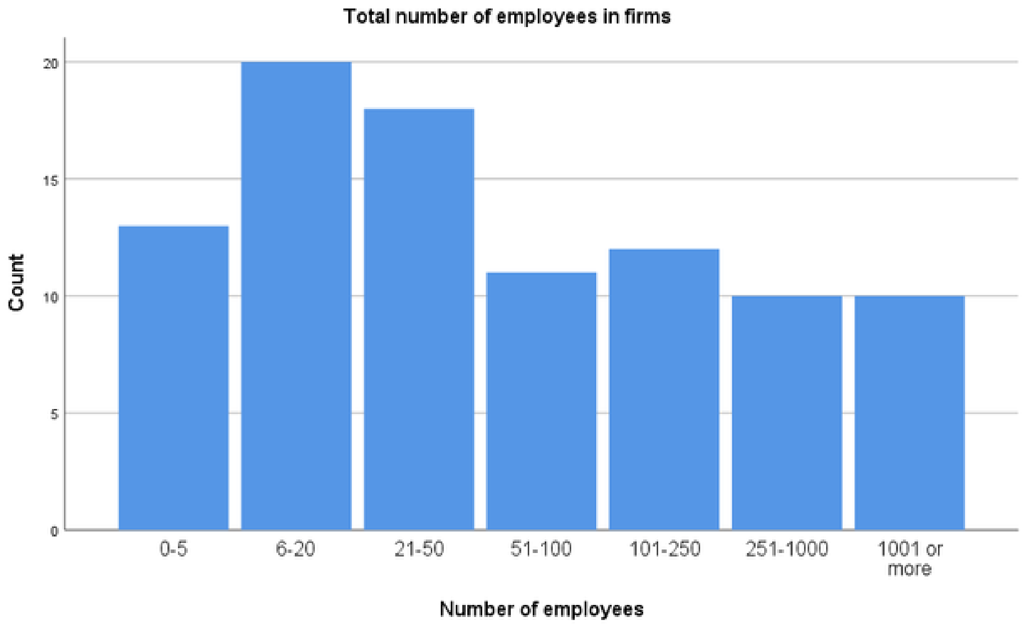


Figure 2. Firms' revenue distribution from OW



In terms of time of entry, only two firms had sales in OW before 2000, while 35 entered OW between 2000-2009, the remaining 45 firms between 2010-2017. In terms of number of employees, 22 firms had fewer than 10 employees, 32 firms had 10-50 employees, 29 companies with 51-500 employees, and the biggest 14 companies had more than 500 employees. Finally, revenues in OW-related business was responsible for less than 1 million NOK in 31 firms, and more than 100 million NOK in 11 firms, while the remaining firms fell somewhere in between.

Figure 3. Firm size (number of employees)



Survey Measures and Analysis

Survey measures were developed from a combination of interview data, prior theory, and previously validated scales. The following measures were taken by the survey: *motivation* (environmental, financial, and legitimacy), *relatedness* (technological and market), *risk* (government, market, partner, ability, and cultural), and *perceived market performance*. In relation to previous literature, the three *motivation* measures were based on Bansal & Roth's (2000) motivations for firms going green, while the two *relatedness* measures were adapted from Pehrsson's (2006) work on business relatedness. Furthermore, the *risk* measures were adapted from work by Duncan (1972), Miller (1993), and Werner, Brouthers, and Brouthers (1996) on international uncertainty and risk. Finally, a 4-item *perceived market performance* measure was employed and based on market performance as conceptualized by Dess and Robinson Jr (1984). The measures used 5-point unipolar response scales, from 1 = "Do not agree" to 5 = "Completely agree" for the motivation, relatedness, and perceived performance measures, and from 1 = "No risk" to 5 = "Very high risk" for the risk measures.

Principal components analysis was conducted to determine component loadings for the items measuring motivation, relatedness, risk, and performance items. In addition, Cronbach's alphas were assessed to indicate the reliabilities of the measures. All measures with their respective reliabilities and loadings are reported in the Survey Measures table (Table A1) of the appendix.

To analyze some of the relationships between the survey measures, a simple Pearson's correlation analysis was conducted. Ultimately, the empirical findings below are based on triangulation analysis of the various data sources.

RESULTS

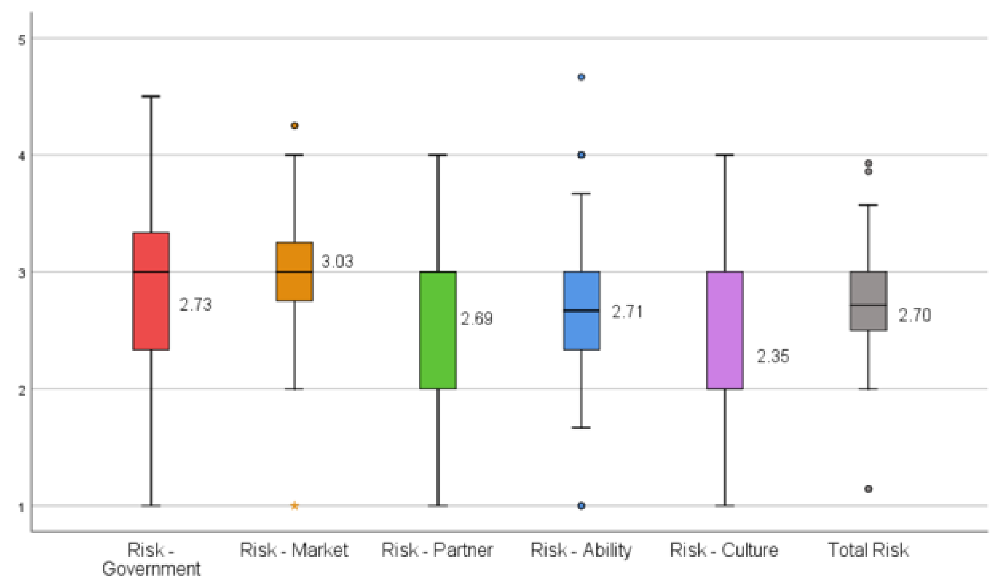
In analyzing the new market characteristics and their influence on strategic entry behavior, the study predominantly relies on the quantitative data and managers' market assessment. Interviews showed that managers perceived new market characteristics much in line with the literature presented above and that these assessments influence actual strategic firm entry behavior.

For example, managers reported high levels of **risk and uncertainty** related to the new market. These risk assessments were not only related to technological solutions, or the ability to win contracts, but also political risk as wind park developments require licenses, and often subsidies, from the state. As company A stated:

With subsidies comes political incentives. Change of government and political processes affect the execution of projects and project horizons.

The survey data provides an overall representation of managers' risk assessments of the OW industry (see Figure 4). As in the qualitative data, the survey finds political and market risk to be of highest concern.

Figure 4. Risk assessment in of the OW industry



High levels of perceived political risk also showed direct influence on events and strategic behavior. For example, Company E, stated that it negatively influenced their ability to find venture capital, and Company F argued that political risk had delayed their entry into OW with several years. The relatively high levels of risk and uncertainty triggered various risk reducing strategies. First, entering firms were reluctant to make acquisitions and used entry modes that required low levels of financial investments (typical export). The rationale was not to expose the firm to too much financial risk. Company K explained:

We reduced risk by entering the OW industry incrementally, using existing organizational units and using existing resources.

Second, firms sought collaboration with other industrial firms to share and reduce risk. Finally, most firms sought a cautious stepwise entry, or even delaying entry for years, until major risk concerns were settled.

Entering firms experienced high levels of **complexity and turbulence** in comparison to other industries they had operated in before. Complexity predominantly stemmed from two sources – either because of long sales cycles, or due to complicated contract negotiations. As Company A stated:

The contracts in the OW industry can be completely different. There is no industry standard, compared to oil and gas.

Turbulence predominantly occurred in the form of rapidly changing customer preferences for technical solutions and new actors with new concepts and business models. During interviews, many examples of this were mentioned, but the most frequent topics were the rapid adoption of bigger turbines and the rapid shift to a dominant design for monopiles. The first OW parks from 1991 were installed with 0.45 MW turbines (65-meter height). In 2013, the largest turbines were 3.6 MW (82-meter height), while the largest currently under testing in 2019 is the 12 MW Haliade-X turbines that reaches 260 meters above sea level. This rapid change in size of turbines have obvious consequences for the operational lifetime of installation and service vessels (Companies B, C and F). Vessels designed to install 82-meter 3.6 MW turbines cannot be used to install 260-meter 12 MW turbines.

Similar developments were observed for substructure concepts (Company D and E). In the early phases of OW there was real competition between various substructure solutions such as jackets, gravity-based solutions and monopiles. Ultimately, monopiles emerged as the dominant design and it currently dominates the market. These challenges also triggered strategic responses from entering firms, but different responses from established and new firms. Established firms developed flexibility by entering into various types of partnerships and by developing a portfolio of solutions dependent on customer requirements. Company I was the firm that was clearest on such portfolio thinking. As a supplier of analytics and forecasts, they participate in a range of tenders all the time, and each contract has its own specifications. Hence, they needed to be flexible:

One out of five, or maybe one out of ten are successful.

New firms could also seek collaboration, but typically not develop portfolios of solutions as firm specific resources were tied to the technologies that formed the basis for their startup. Nor could new firms delay entry to see whether dominant designs emerged, as they would simply run out of cash without the opportunity to test whether their own solutions are competitive. Rather, they opted to run strict risk management routines to avoid risk whenever possible. As Company D argued:

For small firms, entry timing is not a decision. If you have an idea you start working with it and take it from there. (…) OW industry projects carry great risk, which implies that one must focus on risk assessment in every step.

The early phases of OW development was hampered by **high transaction costs**. During the interviews, several sources for high transaction costs emerged, but the main sources were high search costs, monitoring costs, negotiation and contract costs, and high costs of financing. Search cost were predominantly related to identifying customers and partners in an industry where actors and their industry specific capabilities were unknown. Negotiation, contract and monitoring cost arose from lack of standardized contracts, and that contract standards from related industries such as offshore petroleum or energy could not be adopted directly. Finally, significant transaction cost arose due to high financial costs. In the early phases of industry evolution, institutional investors were reluctant to finance large-scale offshore wind farms due to limited historical financial data. The result was very high costs of capital for any actor that sought entry. As Company F reflected:

You can probably get a shipyard for free. I mean, there is an extreme overcapacity. But you'll never get a bank to build a [offshore wind] ship there.

Once again, established actors frequently used a late entry strategy. They simply waited until the financial institutions were eager and ensured enough. The firm that was most deliberate about their late entry strategy was Company F:

We saw that a first-mover position would just drain us of equity and unnecessary resources" … "We value the importance of waiting; it has saved us millions of kroner. Having established premise providers is crucial, and entry in 2014 was early enough.

Other established actors sought collaboration with partners they had worked with previously in the offshore oil & gas industry. The strategy of using existing partners was an effective mitigation strategy to reduce search, negotiation, contract and monitoring costs. For the new, and OW specific firms, this strategy was not an option. Their preferred option was to become a part of larger industrial groups with long-term ambitions in the OW industry and get venture capital from them. This happened with all the new firms in the case study sample. For the firms that were unable to attract such funding, it probably meant bankruptcy. When comparing the survey sample for this study with the global survey executed by Løvdal and Aspelund in 2005 (see Løvdal & Aspelund, 2012), Company D is the only firm that appears in both samples. Hence, survival rates from the early stages of industry formation among the independent startups are very low. As Company J notes:

The whole industry is full of tragic stories.

Finally, new industries are generally associated with **disadvantages of scale and immature/untested** products. Obviously, the OW industry has experienced a significant technological development over the past decades. This technological development has predominantly resulted in larger turbines (see Figure 5), but also wind parks with greater number of turbines. In the early phases of industry evolution, OW suffered significant liabilities of scale to other types of power production, but with the current size of turbines and parks, scale has rather become an advantage for OW. Apart from practical challenges with increasing size of turbines, the interviewees did not mention specific technological challenges related to immaturity of solutions. Several did mention though, that it was in their interest to create economies of scale so that cost levels could come down further and make the industry free of subsidies. In that case, political risk could be removed from the equation and industry growth and profitability would become more predictable. Company C put it this way:

During the past few years, the OW industry has reached cost levels that was not expected until 2020. Soon subsidies are not a factor anymore. It is beneficial not to be dependent on political changes.

The industry's focus on scale to bring down costs has a direct implication for the population of firms in the industry. OW is a capital-intensive industry, and the current development of the industry is driven by capital-rich actors from the energy, engineering and offshore oil & gas sectors. Very few of the small entrepreneurial firms from the 2005 global survey are still in operation, which is an indication that the quest for economies of scale has shifted competitive advantage to large resource-rich actors. Company D noted:

It's hard to stick out as a small firm in the OWI, especially with the rapid growth of the OW farms.

Figure 5. Development of offshore wind turbines (IEA, Technology Roadmap – Wind Energy 2013, www.iea.org)

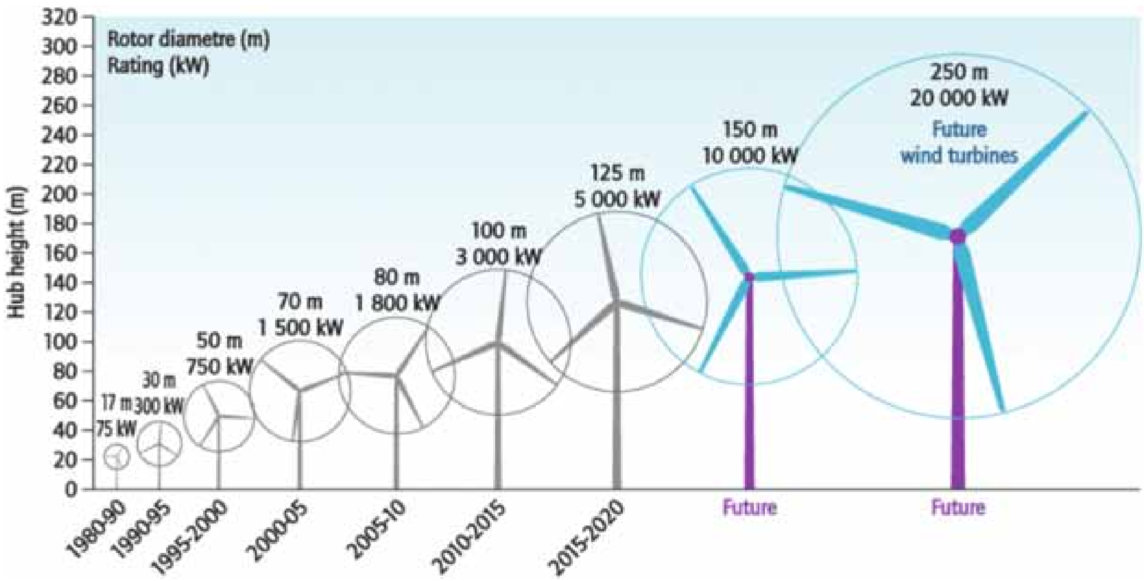


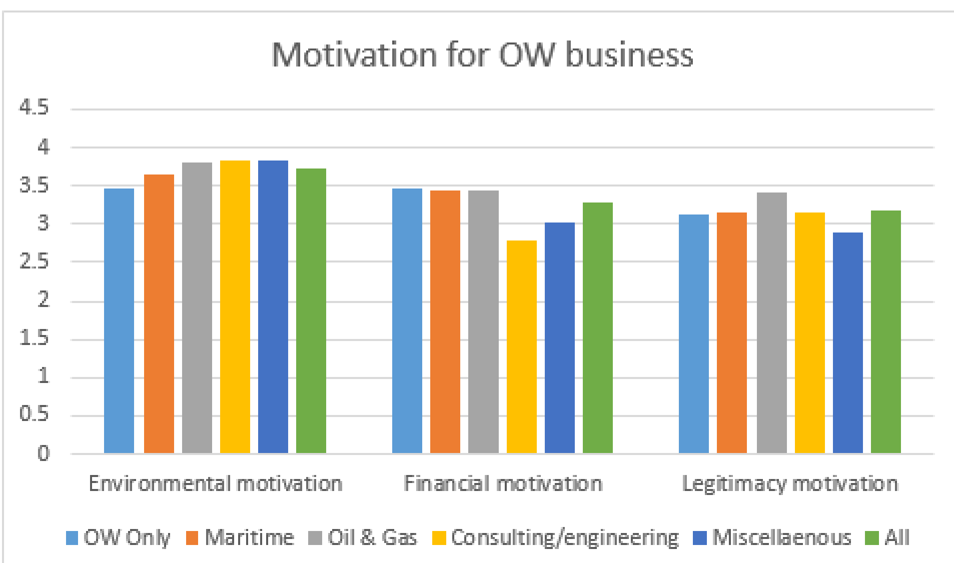
Table 2 summarizes the findings related to new industry characteristics, how these characteristics are manifested in the OW industry, and how these characteristics are directly related to strategic market entry behavior of firms.

Given these industry-specific challenges, it is interesting to investigate the motivations of firms for entry into OW. Using Bansal and Roth's (2000) classification to measure motivation to enter (see Figure 6), environmental motivation is on average the strongest motivation for all types of companies, regardless of industry ($M = 3.73$, on a scale from 1 to 5). Second comes financial motivation ($M = 3.29$) and third, legitimation ($M = 3.22$). Thus, firms enter OW through a desire to contribute to a sustainable energy transition, but they also do so in order to make profits. Still, it is remarkable that most managers report that environmental motivation is the strongest motivation to enter a capital-intensive industry such as this. These findings reflect well the interview data as well. Managers that were interviewed reflected on the potential positive environmental impact of the OW industry. However, the strategic decisions always ultimately required a realistic business case.

Table 2. Industry characteristics, manifestations in OW and firms' strategic response

New industry characteristic	Manifestation in OW	Firm strategic response
Risk and uncertainty	• Political risk associated with licenses and subsidies • General market risk • Lack of institutional/low cost financing	• Delay entry • Incremental/slow market penetration • Extensive inter-firm collaboration and risk sharing
Complexity and turbulence	• Long complex sales cycles • Rapidly changing customer demands • Rapid development of new/larger solutions	• Established firms delay entry • Develop flexibility through partnering and portfolios of solutions • New firms must accept risk and focus on risk management
High transaction costs	• High costs of search, negotiation, contract and monitoring • High costs of capital	• Delay entry • Extensive use of partners from related industries • New and small firms seek financial investments from large MNEs with long term ambitions
Disadvantages of scale and immature/untested products	• Historically, significant disadvantages of scale. Less so at present. • Practical challenges related to larger turbines • Competitiveness switches to larger capital-rich actors	• New and small actors seek to become part of larger concerns to be able to meet requirements of scale

Figure 6. Motivation for OW entry for firms from various industries



Given the result above, one can speculate whether there is a performance liability for firms that enter OW for environmental reasons, towards those who enter for financial or legitimacy reasons. To investigate this, it is possible to look at the relationship between firm motivation to enter OW and perceived firm performance. Market performance is notoriously difficult to measure with objective measures in a new industry because there normally is a time lag between investments and results, so a perceived performance measure was used. Correlation analysis revealed that financial motivation is strongly and positively related to perceived market performance *(.58, $p < .01$)*, indicating that firms that are predominantly driven by profits do best. Correlations with perceived market performance for environmental motivation *(.12, ns)* and legitimacy motivation *(.19, ns)* are also positive, but not significant. This may indicate there is a performance liability for environmental motivation, but this relationship needs to be investigated further in future research.

It is interesting to note the development of Company A in relation to motivation for entry. Their main motivation for entering OW was to attract new talent (considered to be a legitimacy motive in this study). They observed that the brightest young engineers would rather work with renewables than oil and gas and therefore they initiated an OW project to investigate opportunities. Today they have a portfolio of projects in OW worth several billion NOK.

Finally, the study investigates the role of relatedness for firms that diversified from other industries into OW. Survey data reveals that Norwegian firms in OW reported higher technological than market relatedness regardless of which industry the firms came from (see Figure 7). This finding indicates that respondents find that the technological solutions they offer in OW are quite similar to those they deliver in other markets, while the market itself is perceived to be quite different. There are also indications that technological challenges were perceived to be easier to overcome in both the survey and interviews. For instance, there are few examples that firms used acquisitions or partner strategies to get access to key technologies they needed to enter OW. On the contrary, most firms reported that they predominantly relied on already existing internal engineering capabilities to develop OW solutions.

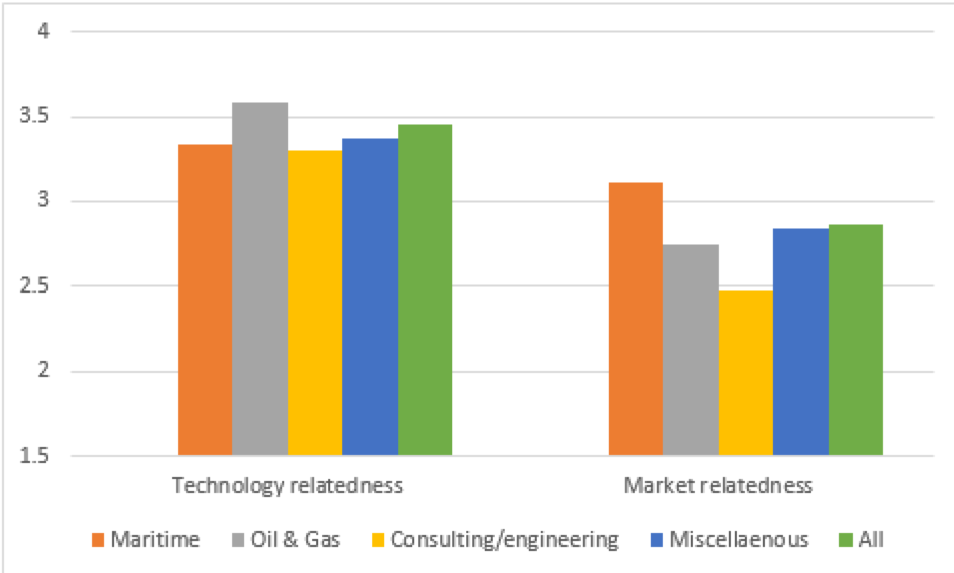
On the other hand, there are several indications from case companies that the immaturity of the market is challenging, for instance the lack of standardized contracts (as mentioned above), which made the value of existing market resources and capabilities that are developed in other industries, hard to leverage in OW. These effects are again strengthened by having to compete in new global markets, as illustrated by company A:

(..) it is challenging that both customers and competitors are much more global in OW than in our traditional market within oil and gas.

In these new international markets, the OW firms typically had limited network, low brand awareness and no customer references. Hence, the study concludes that market challenges had more influence on firms' OW market entry behavior than technological challenges. With very few exceptions, the technological solutions that firms needed in order to enter the new industry were developed in-house using existing engineering and technical capabilities. Market resources, on the other hand, predominantly had to be built from scratch.

Further evidence of the importance of market relatedness for OW companies can be seen from the survey results. Comparing the correlation between perceived market performance and market relatedness *(.38, $p < .01$)* to the correlation between perceived market performance and technological relatedness *(.11, ns)*, reveals that it is market relatedness that is most closely associated with perceived market perfor-

Figure 7. Technological and market relatedness



mance. In other words, although technological relatedness may be more common among the OW firms engaged in multiple industries, it is market relatedness that is crucial in predicting their performance.

DISCUSSION AND IMPLICATIONS

The present study investigates managerial assessment and strategic market entry behavior in a renewable energy industry that are based on international resource input from inception (Bjørgum et al., 2013). These types of industries are important to understand if we are to follow the development pattern in the Paris Agreement and keep global warming under 1.5 degrees Celsius.

Previous studies have shown that new industries have key characteristics that distinguish them from mature markets (Aldrich & Fiol, 1994; Christensen & Raynor, 2013; Forbes & Kirsch, 2011; Klepper & Graddy, 1990; Möller & Svahn, 2009). In addition, previous research has shown that industries that are based on international supply chains from inception – Born Global industries – also have some distinguishing features (Aspelund et al., 2017; Bjørgum et al., 2013; Løvdal & Aspelund, 2012; Løvdal & Moen, 2013). The present study confirms that these characteristics are present in a new industry like OW, and it contributes to the research by showing how these characteristics trigger specific strategic behavior and shape firm entry strategies.

This study also contributes to the research on motivation for entering green industries. Bansal and Roth (2000) provided a model for green motivations that was adopted in the survey. It is intriguing to observe that managers' report environmental motivation to be the strongest motivation to enter OW. However, we need to remember that firms' motivations are not mutually exclusive. Even though environmental motivation is highest, the motivation types do not show great differences between them. It is more likely that environmental motivation is a sway argument – meaning that if the economic opportunities were similar, the environmental argument would sway the strategic decision in that direction. Furthermore, this study also contributes by investigating the qualitative motivation arguments that lie beneath the survey responses, and by identifying the relationship between financial motivation and perceived firm performance.

Finally, this study contributes to the study of relatedness in strategic management (Palich et al., 2000) and the differentiated effect of technological versus market relatedness on firm performance (Helfat and Eisenhardt, 2004; Pehrsson, 2006). Few studies have looked at the distinction and relationship between these two concepts (Nocker et al., 2016), and this study finds that technological and market relatedness play different roles in the diversification process. In OW, it is clearly the entering firms' un-relatedness of the market, which has provided most problems, while technological solutions have been found by using predominantly existing internal engineering capabilities. In addition, the technological relatedness was relatively straightforward to identify and assess before firms entered the OW industry, while the difference in market relatedness regarding standard of contracts, competition in global markets and lack of references and brand awareness were not. This can most likely explain why so many of the entering firms still have such a limited activity level in OW.

Implications for Managers

The major takeaways for managers from this study are related to the awareness of what market characteristics firms are likely to meet when entering globally emerging industries like OW. The interviews show that even experienced market managers were surprised by how different the OW market worked compared to more established markets such as offshore oil & gas. As Company A noted:

The industry was more immature than initially expected. This applies to the customer base, suppliers and governmental requirements.

More than just awareness, this study contributes with insight into how different companies – new and established – have dealt with the market-related challenges of the new industry.

Implications for Policy

The most important implication for policy relates to the technological versus market relatedness debate. There will always be a debate on whether governmental support should support R&D grants to develop technological solutions in renewables, or the support should go to correcting market imperfections. This study suggests the latter. This study finds that the timing and commitment to a new renewable industry is more dependent on assessment of market characteristics than non-availability of technological solutions. Hence, from a firm perspective, support for correcting market imperfections would be more efficient to stimulate rapid and extensive entry into OW. That said, the present study does not quantify this effect. Nor does it account for the effect of historic regulations and governmental support to this sector. Therefore, a more thorough assessment of what would provide the best financial and environmental effect for the government must be left for future research.

On personal reflection, when the study of the OW industry began, the assumption was that it was simply a cost game. In other words, if petroleum prices were high, renewables became more competitive and investments would flow to renewables. This never happened. From the shift of the millennium to 2014, oil prices were high, and renewables attracted very few investments. When oil prices fell in

2014, the petroleum service market became less attractive and industrial capital sought new markets, and ultimately found it in OW. As Company F stated:

The offshore wind industry was something we phased in as oil and gas pretty much disappeared [after the 2014 oil market crash].

Hence, it is not a cost game. It is an investment game. As such, policymakers that want to direct investments towards green industries need to make sure that green investments carry comparable risk and reward as investors and businesses can find in brown industries. If that is the case, this research shows that business managers will prefer the environmentally responsible investments option.

Limitations and Further Research

The present study has some methodological strengths because it employs both a qualitative and quantitative approach. Through case studies representing various positions in the supply chain and a survey covering 60 percent of the total population of Norwegian firms in OW, it provides valuable insight into the dynamics of the industry. The study's generalizability to other countries may be limited since the investigation is focused on Norway, a country that is highly dependent on the oil & gas industry. However, the authors have no reason to suspect that Norwegian companies behave differently than other firms *per se*. Moreover, this study provides a unique and interesting perspective of an extreme case, where most of the firms are affected by the economic state-of-affairs in oil and gas. When oil and gas prices are high globally, there are few other industries that are more financially attractive, and firms thus tend to move in that direction. Hence, to increase generalizability, future research could include studies in other countries.

Another limitation is that the present study only focuses on OW. OW has certain particularities that make it unique when compared to some other new green or global industries. First, it is more capital intensive than most other industries. Hence, the entry barriers in OW are higher than most – e.g., they are higher than the microelectronics design industry as investigated by Aspelund et al. (2017), where input factors were predominantly engineering man hours. In addition, OW is an industry where large structures and offshore locations makes maintenance disproportionally expensive and hazardous. For this reason, OW operators have adopted strict routines for testing, qualification and safety, health, and environment practices. These practices might favor large actors more than small ones. Therefore, it would be prudent to research other new and green industries to investigate these differences.

CONCLUSION

This study departed from the question of how top managers perceive business opportunities in terms of new market characteristics, underlying motivation, and the role of technological and market relatedness in a new, renewable energy industry. First, the study concludes that OW, as a new emerging global industry, has some characteristics that influence managerial decision-making and firms' entry behavior. Specifically, the paper has shown how aspects of risk and uncertainty, complexity and turbulence, high transaction costs, and disadvantages of scale manifest themselves in the OW industry and directly triggers strategic behavior from entering firms to deal with them. These characteristics can help explain why the development and growth of new green industries are slow and why firms engage in them with caution.

In the early stages of industry evolution, perception of risk, uncertainty and expectations of high transaction costs make established actors postpone market entry, or alternatively, adopt a cautious and incremental approach to entry. New firms, on the other hand, simply need to accept high levels of risk and uncertainty in early stages, in order to leverage first mover advantages and build experience and competitiveness before the large global energy, maritime, and offshore supply companies move in to position themselves in the new industry. However, new firms face another challenge because the same characteristics also limit availability of capital, effectively limiting their ability to grow. Overall, the result is a slow and incremental growth of an industry that we, for sustainability reasons, would prefer to see growing fast.

Regardless of the challenges and uncertainties of OW, companies are still attracted to the business opportunities in the industry. Surprisingly though, financial motivation is not the highest-rated motivation for firms entering OW. Coming first is environmental motivation, which shows that the development of OW is at least partially driven by global citizenship and environmental corporate responsibility. Finally, the study concludes that firms that diversify into OW perceive technology to be more related than the market, and that market relatedness is associated with perceived performance in OW, but technology relatedness is not. In other words, managers perceive market differences to be more challenging than technological obstacles. Thus, from a policy point of perspective, if a rapid and extensive entry into new, global and green industries is desired, then one should focus more on correcting market imperfections than funding pure technological R&D projects.

REFERENCES

Aldrich, H. E., & Fiol, C. M. (1994). Fools Rush in? The Institutional Context of Industry Creation. *Academy of Management Review*, *19*(4), 645–670. doi:10.5465/amr.1994.9412190214

Ansoff, H. I. (1957). Strategies for diversification. *Harvard Business Review*, *35*(5), 113–124.

Aspelund, A., Azari, M. J., Aglen, A. F., & Graff, S. G. (2017). The birth and development of a born global industry: The case of microelectronics in Norway. *Journal of International Entrepreneurship*, 1–27. doi:10.100710843-017-0206-3

Bansal, P., & Roth, K. (2000). Why companies go green: A model of ecological responsiveness. *Academy of Management Journal*, *43*(4), 717–736.

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. doi:10.1177/014920639101700108

Bjørgum, Ø., Moen, Ø., & Madsen, T. K. (2013). New ventures in an emerging industry: Access to and use of international resources. *International Journal of Entrepreneurship and Small Business*, *20*(2), 233–253. doi:10.1504/IJESB.2013.056281

Christensen, C., & Raynor, M. (2013). The innovator's solution: Creating and sustaining successful growth. Brighton, Massachusetts: Harvard Business Review Press.

Davis, S. J., Caldeira, K., & Matthews, H. D. (2010). Future CO2 Emissions and Climate Change from Existing Energy Infrastructure. *Science*, *329*(5997), 1330–1333. doi:10.1126cience.1188566 PMID:20829483

Dedecca, J. G., Hakvoort, R. A., & Ortt, J. R. (2016). Market strategies for offshore wind in Europe: A development and diffusion perspective. *Renewable & Sustainable Energy Reviews*, *66*, 286–296. doi:10.1016/j.rser.2016.08.007

Dess, G. G., & Robinson, R. B. Jr. (1984). Measuring organizational performance in the absence of objective measures: The case of the privately-held firm and conglomerate business unit. *Strategic Management Journal*, *5*(3), 265–273. doi:10.1002mj.4250050306

Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. *Administrative Science Quarterly*, *17*(3), 313–327. doi:10.2307/2392145

Forbes, D. P., & Kirsch, D. A. (2011). The study of emerging industries: Recognizing and responding to some central problems. *Journal of Business Venturing*, *26*(5), 589–602. doi:10.1016/j.jbusvent.2010.01.004

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362. doi:10.1002/job.322

Gustafsson, R., Jääskeläinen, M., Maula, M., & Uotila, J. (2015). (Forthcoming). Emergence of Industries: A Review and Future Directions. *International Journal of Management Reviews*. Advance online publication. doi:10.1111/ijmr.12057

Hansen, G. H., & Steen, M. (2015). Offshore oil and gas firms' involvement in offshore wind: Technological frames and undercurrents. *Environmental Innovation and Societal Transitions*, *17*, 1–14. doi:10.1016/j.eist.2015.05.001

Helfat, C. E., & Eisenhardt, K. M. (2004). Inter-temporal economies of scope, organizational modularity, and the dynamics of diversification. *Strategic Management Journal*, *25*(13), 1217–1232. doi:10.1002mj.427

Jacobides, M. G., & Winter, S. G. (2005). The co-evolution of capabilities and transaction costs: Explaining the institutional structure of production. *Strategic Management Journal*, *26*(5), 395–413. doi:10.1002mj.460

Klepper, S., & Graddy, E. (1990). The evolution of new industries and the determinants of market structure. *The RAND Journal of Economics*, 27–44.

Kuhn, T. S. (1962). The structure of scientiðc revolutions. Academic Press.

Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology*, *56*, 485–516. doi:10.1146/annurev.psych.55.090902.142105

Lieberman, M. B., Lee, G. K., & Folta, T. B. (2017). Entry, exit, and the potential for resource redeployment. *Strategic Management Journal*, *38*(3), 526–544.

Løvdal, N., & Aspelund, A. (2010). International Entrepreneurship in the Offshore Renewable Energy Industry. In R. Wüstenhagen & R. Wuebker (Eds.), Energy Entrepreneurship. Cheltenham: Edward Elgar Publishers.

Løvdal, N., & Aspelund, A. (2012). Characteristics of Born Global Industries - The Birth of Offshore Renewables. In Handbook of Research on Born Globals (pp. 285–309). Cheltenham: Edward Elgar Publishing.

Løvdal, N., & Moen, O. (2013). International Before Commercial: Investigating the Pre-Commercial Phase of International New Ventures. *Journal of Technology Management & Innovation*, *8*(2), 21–34.

Miller, K. D. (1993). Industry and country effects on managers' perceptions of environmental uncertainties. *Journal of International Business Studies*, *24*(4), 693–714.

Mitchell, T. R. (1982). Motivation: New directions for theory, research, and practice. *Academy of Management Review*, *7*(1), 80–88.

Möller, K., & Svahn, S. (2009). How to influence the birth of new business fields—Network perspective. *Industrial Marketing Management*, *38*(4), 450–458.

Nocker, E., Bowen, H. P., Stadler, C., & Matzler, K. (2016). Capturing relatedness: Comprehensive measures based on secondary data. *British Journal of Management*, *27*(1), 197–213.

Palich, L. E., Cardinal, L. B., & Miller, C. C. (2000). Curvilinearity in the diversification–performance linkage: An examination of over three decades of research. *Strategic Management Journal*, *21*(2), 155–174.

Pehrsson, A. (2006). Business relatedness and performance: A study of managerial perceptions. *Strategic Management Journal*, *27*(3), 265–282.

Porter, L. W., & Lawler, E. E. (1968). Managerial attitudes and performance. Cheltenham: Edward Edgar Publishing.

Rennings, K. (2000). Redefining innovation—Eco-innovation research and the contribution from ecological economics. *Ecological Economics*, *32*(2), 319–332.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist*, *55*(1), 68–78.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Steen, M., & Hansen, G. H. (2014). Same Sea, Different Ponds: Cross-Sectorial Knowledge Spillovers in the North Sea. *European Planning Studies*, *22*(10), 2030–2049. doi:10.1080/09654313.2013.814622

Vernon, R. (1966). International Investment and International Trade in the Product Cycle. *The Quarterly Journal of Economics*, *80*, 190–207.

Vernon, R. (1979). The Product Cycle Hypothesis in a new International Environment. *Oxford Bulletin of Economics and Statistics, Special Issue*, *41*(4), 255–267.

Vroom, V. H. (1964). *Work and Motivation*. Hoboken, NJ: Wiley.

Werner, S., Brouthers, L. E., & Brouthers, K. D. (1996). International risk and perceived environmental uncertainty: The dimensionality and internal consistency of Miller's measure. *Journal of International Business Studies*, *27*(3), 571–587.

APPENDIX

Table A1. Survey measures

Survey measures	Reliability	Loadings
Our company is, or wants to be in OW because …		
Environmental motivation	α = 0.861	
… it is important for us to contribute to a better climate.		.835
… OW is good for the environment.		.940
… OW is an energy source that contributes to a better future for all.		.887
Financial (competitiveness) motivation	α = 0.682	
… the OW industry offers good financial opportunities.		.808
… it gives us competitive advantage.		.752
… the OW industry can give our company long-term profitability.		.788
Legitimacy motivation	α = 0.751	
… being in the OW industry makes us a more attractive company to job applicants.		.892
… it has a positive effect on our company's image.		.929
… some of our external stakeholders (e.g., customers, partners, etc.) wanted it.		.636
How much do you agree with the following statements?		
Technological relatedness	α = 0.821	
Technology that we use in OW is similar to that which we use in other business areas.		.762
Product/service design we use in OW is similar to that which we use in other business areas.		.841
Pricing and cost pressures in OW are similar to that which we experience in other business areas.		.719
Product/service development is similar to that which we use in other business areas.		.595
Production processes are similar to those we use in other business areas.		.840
Requirements of employees' competence in OW are similar to other business areas.		.656
Market relatedness	α = 0.843	
Customers' quality demands in OW are similar to other business areas.		.461
Recognition of our brand is similar in OW as in other business areas.		.736
Sales and bid processes in OW are similar to other business areas.		.831
Contracts (wording and development) in OW are similar to other business areas.		.830
We use may of the same customer relationships in OW as in other business areas.		.730
We use many of the same suppliers in OW as in other business areas.		.666
The degree of standardization is similar in OW as in other business areas.		.753
Perceived market performance	α = 0.936	
We consider our OW venture to be a success.		.874
We are satisfied with the progression of our market share.		.954
We are satisfied with our sales development in OW.		.955
We are satisfied with the profitability of our OW.		.877

continues on following page

Table A1. Continued

Survey measures	Reliability	Loadings
How low or high would your company rate risk related to ...		
Government risk	α = 0.719	
… significant changes in tax, tariff, and/or subsidy policies?		.831
… prioritization of local suppliers; rules for local content in foreign markets?		.727
… poor access to financing?		.841
Market risk	α =0.618	
… large variation in demand?		.550
… introduction of superior technology?		.717
… increased offering of substitute or complementary products?		.727
… aggressive price competition?		.728
Partner risk	α = 0.778	
… high costs related to finding good and qualified business partners?		.905
… high costs related to finding good and qualified suppliers?		.905
Ability risk	α = 0.793	
… your ability to meet new demands for products and services?		.857
… your ability to develop your own competitive technical solutions?		.899
… your ability to win contracts?		.765
Culture risk	α = 0.812	
… business problems due to large cultural differences?		.917
… business problems due to large difference in demands for health, environment, safety, and ethics?		.917

The motivation, relatedness, and perceived performance questions were answered on a 5-point unipolar scale from 1 - “Do not agree” to 5 – “Completely agree”, while the risk questions were answered on a 5-point unipolar scale from 1 – “No risk” to 5 – “Very high risk”.

Chapter 7
A Novel Web-Based Decision Support System for Aggregate Production Planning Problem

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ABSTRACT

The aggregate production planning model aims to match the supply with demand while minimizing the manufacturing or production activity costs. There are many methods in the mathematical programming theory to solve the aggregate production planning problem. This chapter develops a novel decision support system for the aggregate production planning model using the linear programming approach. The aggregate production problem modeled by the linear programming has been coded in R computer programming language, and a novel web application has been developed using Shiny to serve the needs of the production managers. The novel application is adjustable for any production setting and planning horizon for firms in global transitioning.

INTRODUCTION

Globalization has accelerated the speed of digitalization. Although there are many arguments on whether globalization increases sustainability and creates wealth through digital transformation, the concept of Industry 4.0 has shifted the paradigm, just as the previous industrial revolutions did. Nowadays, the operational practice and the global industry transition is towards digitalizing the production processes.

Production planning activities constitute a great portion of contemporary economical concepts, since the act of producing is a central function in all economic units. Scientific literature on production classifies these activities in many ways while explaining the means of their implementation for sustainability and profitability. For instance, the division of labor, an idea pioneered by the renowned economist Adam Smith, creates an appalling impact on productivity (Thornton, 2014). Nevertheless, the task of selecting and implementing an appropriate production planning and control tool requires the use of mathematics.

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Operations transform the physical material or abstract thinking into finished goods or completed products or services. Although the scope of an operation is limited to an activity on the product, implementing a production planning and control tool into the organization is challenging and demands a multidimensional perspective. Findings from the disciplines of operations management and operations research present a wide range of opportunities to entrepreneurs for improving their businesses. The distinction between these two fields is that while the practitioners and scholars of operations management focus on the design, creation, technology, production, development, procurement, delivery or coordination of the products or services, operational researchers apply quantitative methods for solving operational problems (Omor, 2020).

The planning activities should generate robust links to match the customer demand with the supply capacity of the enterprise. Cachon and Terwiesch (2012) emphasize the importance of operations management by equalizing it to matching supply with demand, and state that "*organizations that take the design of their operations seriously and aggressively implement the tools of operations management will enjoy a significant performance advantage over their competitors*". Digitalizing the operations is a way to achieve this performance edge and depends heavily on the data that the organizations harbor.

This chapter equips the reader with the knowledge on the implementation of a decision support system for aggregate production planning using the R programming language and its application development package, namely Shiny. The aim of the chapter is to present the development of a state-of-the-art aggregate production planning model and convert it into a web-based application utilized for the production departments of the enterprises. The fundamental research question of this design and calculation task is to examine whether the conversion of the mathematical knowledge into a practical application is feasible.

Matching supply with demand by the help of modern mathematical optimization techniques might significantly contribute to businesses. Efforts for developing a useful web-based application also provides a profitable business opportunity as more companies realize the ever-increasing importance of digitally transforming their production planning activities. Therefore, an organic byproduct of this study is the outline for a profitable business opportunity. Digitalizing the manufacturing environments need productivity applications, and a web-based application whose domain is the aggregate production planning might satisfy this type of demand.

The structure of the chapter is as follows: The background section provides a literature review on the domain of decision support systems of aggregate production planning and control. The next section provides methodological details on the aggregate production planning model based on linear programming approach. The chapter then provides further details on developing the novel application using R programming language. Finally, the chapter ends with future research directions, a discussion of the overall coverage and concluding remarks.

BACKGROUND

In economics, the concept of planning refers to the state intervention and the debate around how it intertwines with the global economy has been going on since decades (Kazgan, 2000). In management science, planning refers to the production planning and control activities of a company. This background section aims to explain the definitions of production planning and control along with decision support systems as well as presenting the recent developments in the reviewed scientific literature.

LITERATURE REVIEW

Production Planning and Control

The production planning and control activities require an interdisciplinary perspective that lies at the crossroad of operations management and operations research. Operations research, in other words, the science of better, uses mathematics to find answers to decision making problems. Kandiller (2007) defines operations research as "*the application of scientific models, especially mathematical and statistical ones, to decision making problems*". Operations management, on the other hand, relates the operational activities of companies for sustainability and profitability via optimal decisions.

A proper operational planning and process design might create wealth and value for the company (Krajewski, Malhotra, & Ritzman, 2016). There are many definitions, approaches, and classifications in the scientific literature for production planning and control activities. The production planning includes various concepts such as goal setting, team organization, materials' requirement, demand forecasting, labor assignment, or production scheduling. However, the principal is to match the supply with demand within the expected quality and budget limits.

Chase, Robert and Nicholas (2006) classify the management decisions related to the operations function of a company into three categories as strategic decisions of long-term, tactical decisions of intermediate-term, and operational planning and control decisions of short-term planning horizon. A similar classification is provided in Nahmias and Olsen (2015) through a detailed planning and control framework for a company.

Long term decisions include decisions related to broad strategic issues such as facility location, strategy and objectives, whereas intermediate or tactical decisions incorporate master production scheduling and capacity planning, and finally short-term planning decisions include operational planning and shop floor control activities related to, such as, daily production scheduling, sequencing, and assignment decisions (Heizer, Render, & Munson, 2017; Jacobs & Chase, 2018; Krajewski et al., 2016).

Production managers consider many concepts such as cost, workforce, machinery, materials, and methods while preparing a robust production plan. The aggregate production planning model include these concepts to provide a useful framework for a sound production planning of a multiperiod time horizon. The next section provides detailed information on the intermediate yet strategic aggregate production planning and control activity.

Aggregate Production Planning Model

Charnes and Cooper (1957) define planning, operations and control as the three pillars of management activities. Saad (1982) surveys and classifies production planning models introduced in the literature and reports that the work of Hanssmann and Hess (1960) is the first of its kind with respect to the linear programming formulation of the aggregate production planning model. The works of Holt (2002) and Holt, Modigliani and Simon (1955) have detailed the practical aspects of aggregate production planning through the historical perspective. Singhal and Singhal (2007) indicate that the pioneering work of Holt et al. (1955) has led to a renaissance by assigning the aggregate production planning its central role in the field of operations management.

Aggregate production planning is a decision-making tool that helps the company to decide for the levels of various production factors while harboring an aggregate perspective of supply and demand.

These levels of production factors include, but are not limited to, workforce, inventory, stock out and subcontracting. Nahmias and Olsen (2015) position the aggregate production planning under the strategic portion of the planning and control framework where other strategic planning and control activities include, but, again, not limited to, long-term demand forecasting and financial planning.

Aggregate production planning is closely related with other types of production planning and control activities. Jamalnia, Yang, Feili, Xu, and Jamali (2019) have listed these interconnected planning activities under three categories of long, medium and short range. Long term production planning and control activities include market research and demand study, product development decisions, research and development, demand forecasting, capacity planning, and human resource planning; whereas short range planning activities include master production scheduling, material requirements planning and production scheduling. The authors argue that the aggregate production planning is a medium-range planning tool along with the external capacity and inventory planning activities.

Reviewed literature on the aggregate production planning problem states that it serves for a planning horizon of 3 to 18 months (Chopra & Meindl, 2016; Goli, Tirkolaee, Malmir, Bian, & Sangaiah, 2019), but note that the horizon can be adjusted for any time unit. Many scholars have proposed different strategies for aggregate production planning. For instance, Heizer, Render, and Munson (2017) propose eight aggregate planning strategies, where the first five rely on capacity and the others reflect the variations from the demand side:

- Changing inventory levels
- Varying workforce size by hiring or layoffs
- Varying production rates through overtime or idle time
- Subcontracting
- Using part-time workers
- Influencing demand
- Back ordering during high-demand periods
- Counter seasonal product and service mixing

Chopra and Meindl (2016) mention that hybrid strategies are also available such as chase, flexibility, and level. The authors add that a planner generally uses a hybrid approach.

The task of planning the production in a manufacturing/production setting is a very tough but a rewarding process. A multidimensional perspective for the production environment might easily reduce costs while improving efficiency. There are many ways to find a solution for the aggregate production planning problem and the objective is typically to minimize the cost. Cheraghalikhani, Khoshalhan and Mokhtari, (2019) and Jamalnia, Yang, Feili, Xu and Jamali (2019) provide a systematic review while presenting a detailed classification for the aggregate production planning models in the literature.

A widely used approach in basic quantitative models of the aggregate production is to use the graphical and spreadsheet models. However, these models can be prone to mistakes as they work on a trial and error basis (Heizer et al., 2017; Jacobs & Chase, 2018). There is a wealth of linear programming applications within the discipline of production planning and control (Taha, 2017).

The aggregate production planning problem can be modeled using linear programming. Chopra and Meindl (2016) use the linear programming method of mathematical optimization theory to find the optimal values of an aggregate production planning problem.

If there exists parametric constants of $c_1,\ldots,c_n \in \mathbb{R}$ such that $z=c_1x_1+\ldots+c_nx_n$, then the function $z:\mathbb{R}^n \to \mathbb{R}$ is called a linear function. Let $z:D\subseteq\mathbb{R}^n \to \mathbb{R}$; for $i=1,\ldots,m$, $g_i:D\subseteq\mathbb{R}^n \to \mathbb{R}$; and for $j=1,\ldots,l$, $h_j:D\subseteq\mathbb{R}^n \to \mathbb{R}$ be functions with $z(x_1,\ldots,x_n)$ as the linear objective function, $g_i(x_1,\ldots,x_n)£b_i$ as the linear inequality constraints and $h_j(x_1,\ldots,x_n)=r_j$ as the linear constraints. Then, the general form of a mathematical programming or the linear optimization problem, where x stands for the decision variables, is as follows:

max $z(x_1,\ldots,x_n)$ subject to, or such that, (s. t.)

$$\begin{aligned} &g_1(x_1,\ldots,x_n)\le b_1\\ &\quad\vdots\\ &g_m(x_1,\ldots,x_n)\le b_m\\ &h_1(x_1,\ldots,x_n)=r_1\\ &\quad\vdots\\ &h_l(x_1,\ldots,x_n)=r_l \end{aligned}$$

A linear programming problem either maximizes or minimizes the linear objective function subject to equality or inequality constraints of linear functions. Let

$c\in\mathbb{R}^n,\ b\in\mathbb{R}^m,\ r\in\mathbb{R}^l,\ A\in\mathbb{R}^{mxn},\ H\in\mathbb{R}^{lxn}$ and $x\in\mathbb{R}^n$;

then the above linear program can be written as follows:

$$\max z\left(x_1,\ldots,x_n\right)=c^T x=c_1x_1+\ldots+c_nx_n$$

s. t.

$$\begin{aligned} &a_{11}x_1+a_{12}x_2+\ldots+a_{1n}x_n\le b_1\\ &a_{21}x_1+a_{22}x_2+\ldots+a_{2n}x_n\le b_2\\ &\vdots\\ &a_{m1}x_1+a_{m2}x_2+\ldots+a_{mn}x_n\le b_m \end{aligned}$$

$$\begin{aligned} &h_{11}x_1+a_{12}x_2+\ldots+h_{1n}x_n=r_1\\ &h_{21}x_1+h_{22}x_2+\ldots+h_{2n}x_n=r_2\\ &\vdots\\ &h_{l1}x_1+h_{l2}x_2+\ldots+h_{ln}x_n=r_l \end{aligned}$$

$x_1{}^30,\ x_2{}^30,\ \ldots,\ x_n{}^30$

The following mathematical model is the equivalent of the above linear optimization model, where $\vec{x}$ is the vector of the decision variables -whose optimal values the problem seeks for-, the matrices of (A) and (H) are the technological coefficients matrix of the linear optimization model, and the vectors of $\vec{b}$ and $\vec{r}$ represent the available amount of resources for the constraints:

$$Max\ Z = \vec{c}^T \vec{x}$$

$$A\vec{x} \leq \vec{b}$$

$$H\vec{x} = \vec{r}$$

$$x^{3}0$$

The optimal solution of this problem provides the optimal values for the decision variables along with the optimal value of the objective function, and thus, the state of the constraints. For more details on mathematical optimization and linear programming the reader can refer to Chiang and Wainwright (2005) or Taha (2017).

This chapter develops a decision support system based on the implementation of an exemplary aggregate production planning problem provided in Chopra and Meindl (2016). The optimization problem aims to minimize the total costs that incur from the production planning horizon of 6 months. The decision variables, where t=1,…,6, are defined as follows:

W_t= size of the workforce at month t
H_t= size of the hired workforce at month t
L_t= size of the laid off workforce at month t
P_t= amount of goods or services produced at month t
I_t= inventory level at month t
S_t= stockout level of items at month t
C_t= amount of goods or services outsourced at month t
O_t= overtime period at month t

The linear optimization model includes 8 different production planning variables for 6 months; or a total of 48 decision variables whose optimal values are being examined for the planning horizon. In other words, the aggregate production planning model aims to decide on these decision variables that determine the levels of production, workforce, inventory, capacity, and stock out for the demand of the planning horizon of 6 months. The transpose of the demand vector for the planning horizon provides the monthly demand of the production as follows:

$$D_t^T = \begin{bmatrix} 1600 & 3000 & 3200 & 3800 & 2200 & 2200 \end{bmatrix}$$

As this production planning problem aims for the minimum total cost, the objective function must include a cost vector, corresponding to the decision variables, as follows:

$$c^T = \begin{bmatrix} 640 & 6 & 300 & 500 & 2 & 5 & 10 & 30 \end{bmatrix}$$

Therefore, the optimization problem seeks the minimum of the function *Z*, such that

$$Min\ Z = c^T x = \begin{bmatrix} 640 & 6 & 300 & 500 & 2 & 5 & 10 & 30 \end{bmatrix}$$
$$\begin{bmatrix} W_t \\ H_t \\ L_t \\ P_t \\ I_t \\ S_t \\ C_t \\ O_t \end{bmatrix} = \sum_{t=1}^{6} 640W_t + 6O_t + 300H_t + 500L_t + 2I_t + 5S_t + 10P_t + 30C_t$$

The linear constraints of the problem are classified as workforce, internal capacity, inventory balancing, and overtime. The workforce constraints are as follows:

W_0=80

$$W_t = W_{t-1} + H_t - L_t$$

The first workforce constraint indicates that at the beginning of the planning horizon (where t=0) the initial workforce size is 80. The second constraint is a balancing constraint which indicates that the workforce level at a given period must equal to the sum of the workforce level of the previous period with the size of the newly hired workforce at the current period, subtracted by the laid off workforce at the current period. The next constraint is related to the production capacity of the company:

$$P_t \leq 40W_t + \frac{O_t}{4}$$

This constraint of the linear optimization model indicates that each worker can produce up to 40 units per month on regular time, and 1 unit for every 4 hours of overtime. Therefore, the sum of this amount needs to be less than or equal to the number of units produced in a month of the planning horizon. The next set of constraints provide the formal relations with respect to the company inventory:

I_0=1000

$$I_{t-1} + P_t + C_t = D_t + S_{t-1} + I_t - S_t$$

$I_6 \geq 500$

$S_0=0$

The first inventory related constraint sets out the initial inventory level as 1000 units. The second constraint is a balancing constraint, similar to the second workforce related constraint mentioned above. This constraint is required to balance the inventory levels for each period as the levels of inventory, production, outsourcing, demand, and stock out might vary. Therefore, the left-hand side of the equation, the supply, must be equal to the right-hand side of the constraint, which is the demand at the corresponding period of the planning horizon. In other words, this inventory related constraint guarantees that the supply matches the demand. The third constraint points out the policy of the company at the end of the planning horizon which states that the inventory must be more than or equal to 500 units. The fourth inventory related constraint signals that there are no backlogs at the beginning of the planning horizon. The last constraint is related to the overtime limit and requires that the workforce works no more than 10 hours of overtime per month:

$O_t=10W_t$

In addition to all the above-mentioned constraints, the decision variables need to be non-negative. Furthermore, all decision variables, other than O_t, must be integer, which classifies this model as a mixed integer programming model.

Chopra and Meindl (2016) provide the solution of the minimum total cost over the planning horizon for this case using Microsoft Excel and its Solver add-in. The authors also examine the impact of various cases of higher demand variability and lower costs of hiring and layoff. Schrage (2015) provides detailed information on formulating and solving integer programs. A collection of methods for solving the aggregate production planning model with further detailed explanation on the linear programming approach and a detailed bibliography related to operations planning can be found in Nahmias and Olsen (2015).

The aim of this chapter is to present a novel decision support system based on the aggregate production planning problem modeled by the linear programming approach as detailed above. Next section presents the recent developments in decision support systems of various aggregate production planning models.

Decision Support Systems for Aggregate Production Planning and Control

The quantification of data leads to making better decisions. Decision support systems are one of those core concepts of business analytics that underlie Industry 4.0 as these information systems, ranging from medical diagnostic devices to weather or traffic reports, are built to the support decision making processes. Decision support systems focus on semi-structured or unstructured decision problems and production planning problems are within the category of semi-structured type of decisions that require operational control (Turban, Sharda, & Delen, 2014). These systems help decision makers by overcoming their cognitive limitations of data processing. Therefore, a decision support system is in relation with how a system helps its users with their decisions and has the potential to provide competitive advantage for its users (Jacobs, Berry, Whybark, & Vollmann, 2011).

Avriel, Pri-Zan, Meiri and Peretz (2004) develop an investment decision support system and provide detailed information about the earnings obtained by using this system. Thomas and Bollapragada (2010) have developed tools of decision support based on mathematical models that estimate demands and cost of various products and services along with planning capacity subject to uncertainties of cost and demand in the domain of photovoltaic technology. Yu, Pachon, Thengvall, Chandler andWilson (2004) developed a decision support system for an airline company where the system uses various optimization models and solution methodologies for large scale problems of pilot staffing and training.

There are numerous studies on developing interactive decision support systems for aggregate production planning. Gomes da Silva, Figueira, Lisboa andBarman (2006) develop a decision support system based on a multiple criteria mixed integer linear programming of the aggregate production planning model written in the computer programming language of Borland Delphi. The researchers note that they use LINGO to solve the optimization problem. Tyagi, Kalish, Akbay, and Munshaw (2004) develop a decision support system based on a linear optimization model that maximizes total contribution of manufacturing operations over a planning horizon for to achieve a higher customer satisfaction at a lower cost. The solution for the problem was obtained in only 10 seconds where the authors decided on the optimal production quantities of 3100 decision variables with more than 1000 constraints by considering various manufacturing parameters of price and capacity. The researchers use the linear programming solver of LINGO to solve the optimization problem. The model has been deployed into a decision support system hosted in Microsoft Excel's spreadsheet-based software.

The next and the ideal step after solving the optimization problem of the aggregate production planning model should be to deploy it into a practical decision support system, as Sery, Presti, and Shobrys (2001) perform in their study. This study also mentions the difficulties that disparate business activities and systems raise during the data collection phase of the model building. Cheraghalikhani et al. (2019) also suggest that future research efforts for aggregate production planning should be towards integrated decision support systems.

The design and development of the interface that users interact while using a decision support system, a software or visiting a web site is usually referred to as the front-end or the client-side of the interaction. A user might define the input values for the decision support system at the front-end where the user interface might have various features such as drop-down menu, selection box, or other items regarding the use of application. Back-end, on the other hand, refers to the development tasks of the applications, such as server, software or database; the parts that the user does not see and thus does not interact with (Albright & Winston, 2017). Although a decision support system is based on a computer programming language, its user interface design, or the front-end, is expected to be uncomplicated for an unfriendly user experience might distract the attention of the users with unnecessary technicality.

There are many open-source computer programming languages specialized for developing the computer code for back-end or front-end and building a decision support system for any knowledge domain. Such languages allow both scholars and practitioners to model their quantitative approaches and apply their skills for a wide range of applications. For instance, this chapter uses R programming language, one of the most contemporary and popular open-source languages amongst scholars and practitioners, for operating both ends to develop the novel web-based decision support system of the aggregate production planning model.

Winston and Albright (2019) define three components for a decision support system; an help sheet for users explaining how to use the system, a dialog box for the user to enter the values of the input variables, and the optimal solution report obtained after running the mathematical model underlying the decision support system at the back-end. Spreadsheet models are also an alternative method of developing a decision support system (Olavson & Fry, 2008). Schrage (2015) claims that the impact of the model depends on the reports of the decision support system, and the proper attitude in designing reports is to ask the question of how the results are going to be used. The author also suggests using any existing reports, while developing a decision support system for an interaction.

Next section presents the development of a novel decision support system for the aggregate production planning model using the open-source computer programming language of R.

NOVEL WEB-BASED DECISION SUPPORT SYSTEM OF AGGREGATE PRODUCTION PLANNING MODEL

The back-end of the novel decision support system presented in this chapter uses the mixed integer linear programming method for solving the multiperiod production planning problem. This study uses the GNU Linear Programming Kit (GLPK) based on the study by Gearhart et al. (2013) that compares the performances of open-source linear programming solvers and reports GLPK as one of the best performing open-source solvers available.

The programming code below solves the aggregate production planning problem by Chopra and Meindl (2016) presented in the section titled "Aggregate Production Planning Model: Literature Review":

```
library(Rglpk)
h1 <- c(1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h2 <- c(-1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h3 <- c(0, -1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h4 <- c(0, 0, -1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h5 <- c(0, 0, 0, -1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h6 <- c(0, 0, 0, 0, -1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h7 <- c(40, 0, 0, 0, 0, 0, 0.25, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h8 <- c(0, 40, 0, 0, 0, 0, 0, 0.25, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h9 <- c(0, 0, 40, 0, 0, 0, 0, 0, 0.25, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h10 <- c(0, 0, 0, 40, 0, 0, 0, 0, 0, 0.25, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0)
h11 <- c(0, 0, 0, 0, 40, 0, 0, 0, 0, 0, 0.25, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0)
h12 <- c(0, 0, 0, 0, 0, 40, 0, 0, 0, 0, 0, 0.25, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
    0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0)
```

```
h13 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0,
0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0)
h14 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, -1, 0, 0, 0, 0, -1, 1, 0, 0, 0,
0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0)
h15 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, -1, 0, 0, 0, 0, -1, 1, 0, 0,
0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0)
h16 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, -1, 0, 0, 0, 0, -1, 1, 0,
0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0)
h17 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, -1, 0, 0, 0, 0, -1, 1,
0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0)
h18 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, -1, 0, 0, 0, 0, -1,
1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1)
h19 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
g20 <- c(10, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
g21 <- c(0, 10, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
g22 <- c(0, 0, 10, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
g23 <- c(0, 0, 0, 10, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
g24 <- c(0, 0, 0, 0, 10, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
g25 <- c(0, 0, 0, 0, 0, 10, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
h26 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
A <- matrix(c(h1, h2, h3, h4, h5, h6, h7, h8, h9, h10, h11, h12, h13, h14, h15, h16, h17, h18, h19,
g20, g21, g22, g23, g24, g25, h26), nrow = 26, byrow = TRUE, dimnames = list(c("h1", "h2",
"h3", "h4", "h5", "h6", "h7", "h8", "h9", "h10", "h11", "h12", "h13", "h14", "h15", "h16", "h17",
"h18", "h19", "g20", "g21", "g22", "g23", "g24", "g25", "h26"), c("W1", "W2", "W3", "W4",
"W5", "W6", "O1", "O2", "O3", "O4", "O5", "O6", "H1", "H2", "H3", "H4", "H5", "H6", "L1",
"L2", "L3", "L4", "L5", "L6", "P1", "P2", "P3", "P4", "P5", "P6", "I1", "I2", "I3", "I4", "I5",
"I6", "S1", "S2", "S3", "S4", "S5", "S6", "C1", "C2", "C3", "C4", "C5", "C6")))
B <- c(80, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 600, 3000, 3200, 3800, 2200, 2200, 500, 0, 0, 0, 0, 0, 0, 0)
C <- c(640, 640, 640, 640, 640, 640, 6, 6, 6, 6, 6, 6, 300, 300, 300, 300, 300, 300, 500, 500, 500,
500, 500, 500, 2, 2, 2, 2, 2, 2, 5, 5, 5, 5, 5, 5, 10, 10, 10, 10, 10, 10, 30, 30, 30, 30, 30, 30)
D <- c("==", "==", "==", "==", "==", "==", "==", "==", "==", "==", "==", "==", "==",
"==", "==", "==", "==", "==", "==", ">=", ">=", ">=", ">=", ">=", ">=", "==")
Types <- c("I", "I", "I", "I", "I", "I", "C", "C", "C", "C", "C", "C", "I", "I", "I", "I", "I", "I", "I",
"I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I", "I",
"I", "I", "I", "I", "I", "I")
Rglpk_solve_LP(C, A, D, B, types = Types, max = FALSE)
```

Line 1 of the computer code given above loads the required package library of the GNU Linear Programming Kit developed for R. Lines 2 through 27 define the rows and the elements of the technological coefficients' matrix of the linear programming model, (A). Line 28 combines all these rows into (A) while naming the rows and the dimensions that are going to be seen in the application.

Line 29 defines the right-hand side values of the linear programming model, $\vec{b}$ whereas Line 30 defines $\vec{c}$, the coefficients of the decision variables. Line 31 defines the type of the constraints, and their directions while Line 32 defines the types of the decision variables where the values of I and C stands for integer and continuous type of decision variables, respectively. In this model, only the amount of overtime is a continuous type of decision variable. Line 33 solves the linear minimization problem.

The user interface of the novel web-based application is shown at Figures 1 through 3. The production manager, using a keyboard, can easily enter the coefficients of the decision variables, type of the decision variables, technological coefficients, the type of constraints, and the technological capacity using the novel decision support system.

Figure 1. The user interface of the decision support system for aggregate production planning.

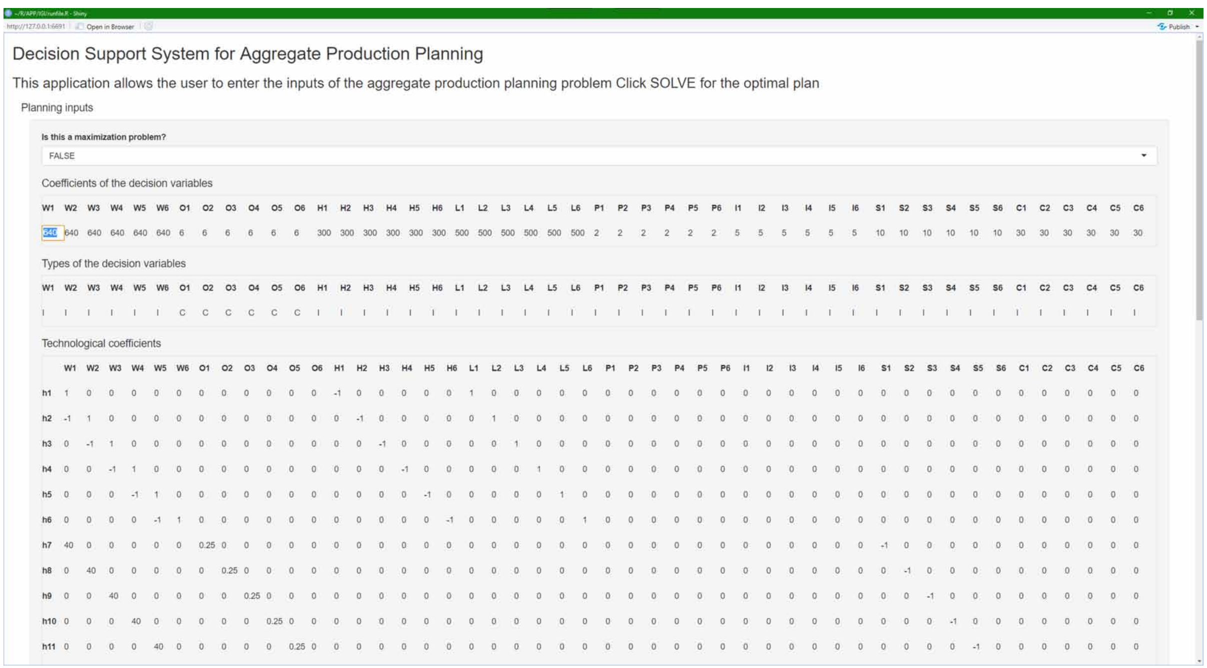
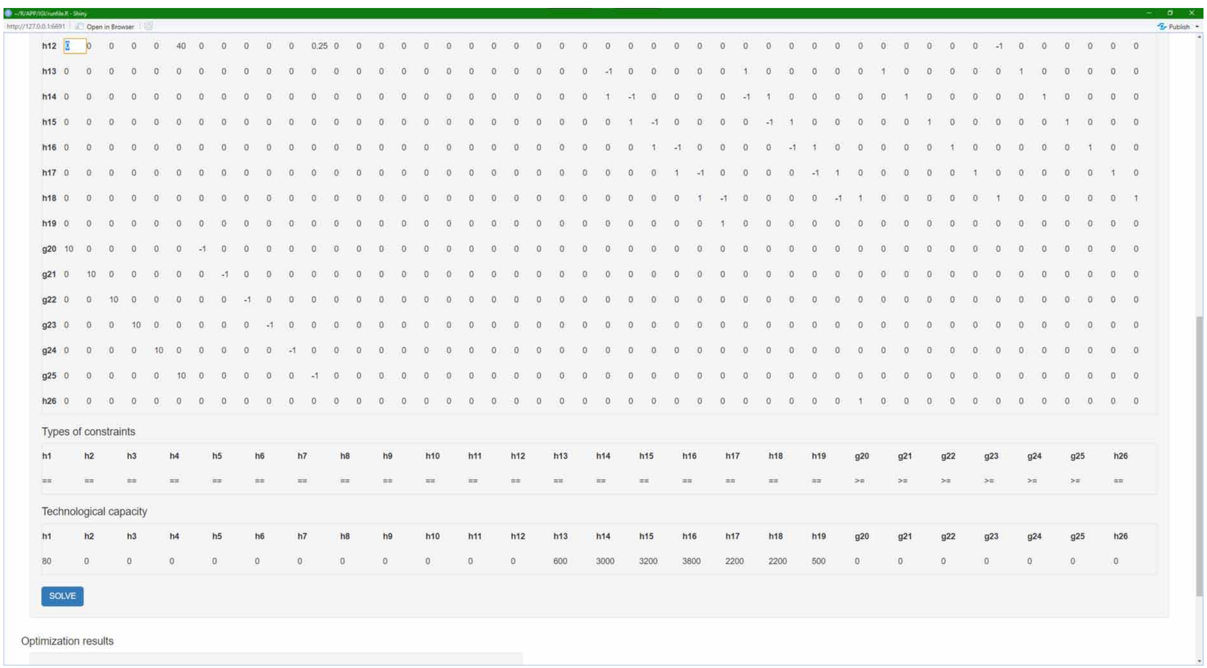


Figure 1 shows the initialization of the decision support system as a Shiny application. The user can define whether to use maximization or minimization within the aggregate production planning problem. Then the user provides the coefficients that correspond to either the unit costs or the unit profits of the decision variables. The type of the decision variables can also be adjusted on the interface. In the production planning problem presented in this chapter, only the overtime is the continuous type of decision variable. The user can enter the technological coefficients of each decision variable corresponding to the related technological constraints.

The decision support system takes place only at a single window, and the rest of the input of the problem is shown at Figure 2. The types of constraints, whether equality or inequality, are adjusted through the user interface. Finally, the technological capacity of these constraints, the right-hand side parameters of the linear optimization problem are provided to the decision support system.

Figure 3 shows the optimization results which include the optimal values of the objective function along with the optimal values of the decision variables. The optimal solution reports the optimal value of each decision variable. For instance, W_0 is 80, and the optimal solution reports that W_1=65, meaning that 15 people should be moved to another project, along with another one in the 4th period, since W_4=64. Another example for reading the solution report would be as follows: The optimum value of the 46th decision variable is 20, meaning that C_4=20, and for the 4th period of the planning horizon, 20 units need to be outsourced -instead of an in-house production process.

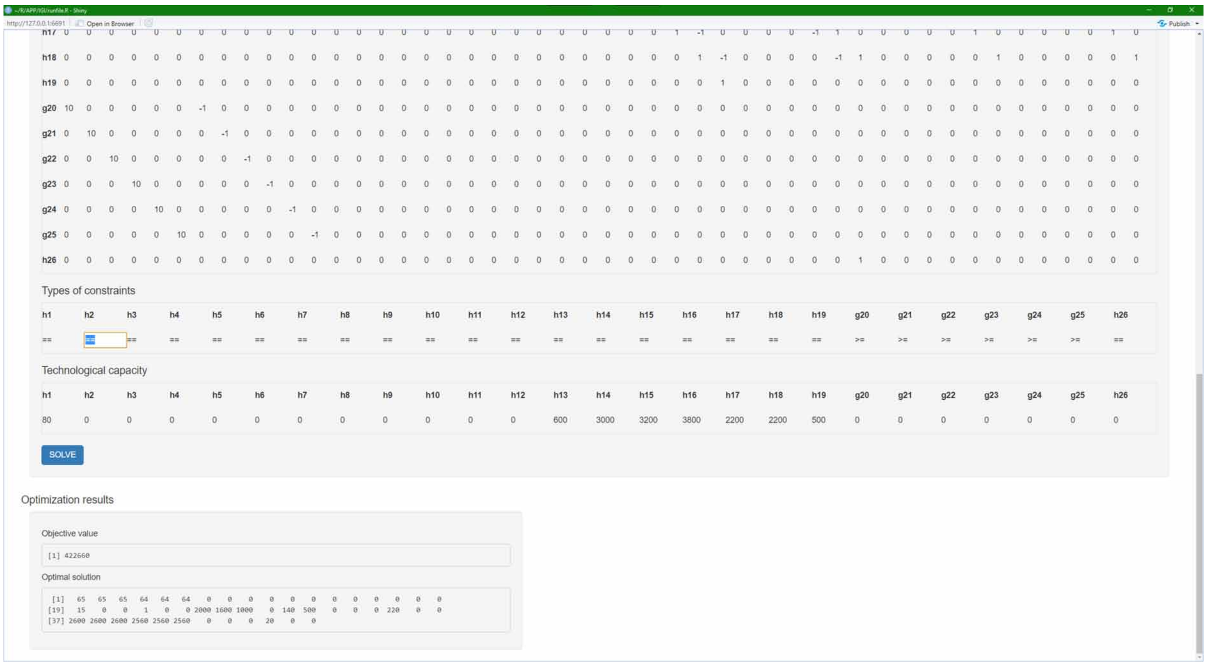
Figure 2. All the input parameters of the production planning problem can be typed at the decision support system through a single window



FUTURE RESEARCH DIRECTIONS

As a rule of thumb, an operations manager or a planner should search for a tailor-made solution instead of randomly choosing a well-known continuous improvement program and following its guidelines. Nave (2002) compares some of these continuous improvement programs with respect to their assumptions and guidelines. A tailor-made approach that includes different aspects of several continuous improvement programs is more preferable for practical reasons (Tayalı, 2016). It is important to note that there is not a unique program for a given production setting, although many of these continuous improvement programs, such as six-sigma or the theory of constraints, contain a robust methodological approach. A

Figure 3. The optimization results are provided at the end of window, after the user clicks the solve button



planner, therefore, should pursue a customized solution by considering the features of the shop floor or the production environment. However, there might be different barriers for the planner on the road, such as the gathering of data from the production environment, mathematically modeling the production plan, or performing calculations using a computer programming language.

Albright and Winston (2017) emphasize that the real-life implementation of an aggregate planning model should follow a rolling planning horizon. This chapter elaborates on the theoretical approach of the aggregate production planning model by using an exemplary data set for the aggregate production planning problem and demonstrating the improvement of a company's production planning performance for a rolling planning horizon while constructing a novel web-based decision support system. A data set from a company might be used in the future to emphasize the practical considerations during the real-life implementation of an aggregate production planning strategy.

Companies require decision support systems for an increase in total factor productivity. For a decision support system, the optimal solution report should be user friendly and informative. The optimal solution report provided in this chapter can be enriched by nontechnical terms to ease the understanding of the decision support system. The linear programming model requires a more practical approach with sparse matrices as well.

Scheduling is used interchangeably for short-term manufacturing planning, whereas aggregate production planning focuses on a longer planning horizon to allocate production resources. To the author's knowledge, there is no study in the literature combining the aggregate production planning method with the short-term manufacturing scheduling. Therefore, the integration of aggregate production planning with production scheduling is another future research direction; contemporary scheduling algorithms can be embedded in this decision support system.

CONCLUSION

To be able to survive in the hypercompetitive business environment, a company should follow a tailor-made approach to digitally transform its production processes. The interdisciplinary field of operations management focuses on modeling the production processes of a company while looking for innovative ways to increase total factor productivity. The only way to increase total factor productivity is through the optimum allocation of available yet limited resources. Mathematical programming strives to model and solve such related problems and the theory of production must use these mathematical optimization methodologies for to obtain optimal solutions at production planning and control activities.

The managerial decisions related to production planning and control activities typically focus on cost minimization as these activities are one of the leading requirements of sustaining a business. In other words, to match the supply with the demand is the key for cost minimization, sustainability, and profitability. The aggregate production planning model matches the supply with the demand in a specified planning horizon to minimize the costs in relation to the decision variables. For practical reasons, the planner should pursue a tailor-made solution for implementing an aggregate production planning strategy. There are many methods for solving the aggregate production planning problem as described in the chapter.

This chapter develops a novel web-based decision support system for the aggregate production planning problem model by using the linear programming methodology of the mathematics theory. Recent developments in the production planning literature suggest that the current trend is to develop decision support systems with user-friendly interfaces for this cult model. The efforts for disseminating such decision support systems should lead the industrial practice and present robust methodological approaches for minimizing operational costs. Therefore, this chapter tries to follow the trend and fill in a gap to serve for the needs of the production planning industry and scholars of the field: To the author's knowledge, there is no web-based application that models the aggregate production planning problem by the open source R programming language and solves it through the linear programming solver of RGLPK.

The novel application contains the main elements of a decision support system, namely, an explanation sheet, a dialog box, and an optimal solution report. By explaining how to develop a novel web-based application, this chapter contributes to the scientific literature of production planning and control activities and the related operational research literature. The application is adjustable for any type of query from a production setting. On the other hand, scholars and practitioners can use this decision support system, without any prior knowledge or background on subjects related to mathematical programming. This decision support system for aggregate production planning problem should help the planners to monitor the production processes and observe whether the company matches the supply with demand in the most efficient way possible.

REFERENCES

Albright, S., & Winston, W. (2017). Business Analytics: Data Analysis and Decision Making (6th ed.). Boston, MA: Cangage Learning.

Avriel, M., Pri-Zan, H., Meiri, R., & Peretz, A. (2004). Opti-money at Bank Hapoalim: A model-based investment decision-support system for individual customers. *Interfaces*, *34*(1), 39–50. doi:10.1287/inte.1030.0061

Cachon, G., & Terwiesch, C. (2012). *Matching Supply with Demand: An Introduction to Operations Management*. London: McGraw-Hill/Irwin.

Charnes, A., & Cooper, W. W. (1957). Management Models and Industrial Applications of Linear Programming. *Management Science*, *4*(1), 38–91. doi:10.1287/mnsc.4.1.38

Chase, R., Robert, F., & Nicholas, J. (2006). *Operations Management for Competitive Advantage* (11th ed.). London: McGraw-Hill/Irwin.

Cheraghalikhani, A., Khoshalhan, F., & Mokhtari, H. (2019). Aggregate production planning: A literature review and future research directions. *International Journal of Industrial Engineering Computations*, *10*, 309–330. doi:10.5267/j.ijiec.2018.6.002

Chiang, A., & Wainwright, K. (2005). *Fundamental Methods of Mathematical Economics*. London: McGraw-Hill/Irwin.

Chopra, S., & Meindl, P. (2016). Supply Chain Management (Global Edition). New York City: Pearson.

Gearhart, J. L., Adair, K. L., Detry, R. J., Durfee, J. D., Katherine, J. A., & Martin, N. (2013). Comparison of open-source linear programming solvers. In *SANDIA REPORT*. Retrieved from https://prod-ng.sandia.gov/techlib-noauth/access-control.cgi/2013/138847.pdf

Goli, A., Tirkolaee, E. B., Malmir, B., Bian, G., & Sangaiah, A. K. (2019). A multi-objective invasive weed optimization algorithm for robust aggregate production planning under uncertain seasonal demand. *Computing*, *101*(6), 499–529. doi:10.100700607-018-00692-2

Gomes da Silva, C., Figueira, J., Lisboa, J., & Barman, S. (2006). An interactive decision support system for an aggregate production planning model based on multiple criteria mixed integer linear programming. *Omega*, *34*(2), 167–177. doi:10.1016/j.omega.2004.08.007

Hanssmann, F., & Hess, S. W. (1960). A Linear Programming Approach to Production and Employment Scheduling. *Management Science, MT*, *1*(1), 46–51. doi:10.1287/mantech.1.1.46

Heizer, J., Render, B., & Munson, C. (2017). Operations Management: Sustainability and Supply Chain Management (12th ed.). New York City: Pearson.

Holt, C. C. (2002). Learning how to plan production, inventories, and work force. *Operations Research*, *50*(1), 96–99. doi:10.1287/opre.50.1.96.17779

Holt, C. C., Modigliani, F., & Simon, H. A. (1955). A Linear Decision Rule for Production and Employment Scheduling. *Management Science*, *2*(1), 1–30. doi:10.1287/mnsc.2.1.1

Jacobs, F. R., Berry, W. L., Whybark, D. C., & Vollmann, T. E. (2011). *Manufacturing planning and control for supply chain management*. London: McGraw Hill.

Jacobs, F. R., & Chase, R. B. (2018). *Operations and supply chain management* (15th ed.). London: McGraw Hill.

Jamalnia, A., Yang, J. B., Feili, A., Xu, D. L., & Jamali, G. (2019). Aggregate production planning under uncertainty: A comprehensive literature survey and future research directions. *International Journal of Advanced Manufacturing Technology*, *102*(1–4), 159–181. doi:10.100700170-018-3151-y

Kandiller, L. (2007). *Principles of Mathematics in Operations Research*. Springer.

Kazgan, G. (2000). *Economic Thought* (9th ed.). Remzi. (in Turkish)

Krajewski, L., Malhotra, M., & Ritzman, L. (2016). Operations Management: Processes and Supply Chains (11th ed.). New York City: Pearson.

Nahmias, S., & Olsen, T. (2015). *Production and Operations Analysis* (7th ed.). Waveland.

Nave, D. (2002). How to compare six sigma, lean and the theory of constraints. *Toc-Cga.Org, 35*(3), 73–80. Retrieved from http://www.toc-cga.org/upload/reference/3.pdf

Olavson, T., & Fry, C. (2008). Spreadsheet decision-support tools: Lessons learned at Hewlett-Packard. *Interfaces*, *38*(4), 300–310. doi:10.1287/inte.1080.0368

Omor. (2020). *OMOR*. Retrieved from http://operations-management-research.essec.edu/home

Saad, G. H. (1982). An overview of production planning models: Structural classification and empirical assessment. *International Journal of Production Research*, *20*(1), 105–114. doi:10.1080/00207548208947752

Schrage, L. (2015). Optimization Modeling with LINGO (6th ed.). Chicago: Lindo Systems Inc.

Sery, S., Presti, V., & Shobrys, D. E. (2001). Optimization models for restructuring BASF North America's distribution system. *Interfaces*, *31*(3), 55–65. doi:10.1287/inte.31.3.55.9635

Singhal, J., & Singhal, K. (2007). Holt, Modigliani, Muth, and Simon's work and its role in the renaissance and evolution of operations management. *Journal of Operations Management*, *25*(2), 300–309. doi:10.1016/j.jom.2006.06.003

Taha, H. (2017). Operations Research: An Introduction (10th ed.). New York City: New York City: Pearson.

Tayalı, H. A. (2016). A Literature Review on Production Scheduling with the Drum-Buffer-Rope Technique. *16th International Symposium for Production Research*, 1085–1090. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2919846

Thomas, B. G., & Bollapragada, S. (2010). General Electric uses an integrated framework for product costing, demand forecasting, and capacity planning of new photovoltaic technology products. *Interfaces*, *40*(5), 353–367. doi:10.1287/inte.1100.0518

Thornton, P. (2014). *The Great Economists: Ten Economists Whose Thinking Changed the Way We Live*. Retrieved from https://www.google.com/books?hl=tr&lr=&id=2oXOAwAAQBAJ&oi=fnd&pg=PT3&dq=The+Great+Economists+phil&ots=oZB5Fz1Tak&sig=fhGlAOQirYY5lYHX1KzlO6LvCUE

Turban, E., Sharda, R., & Delen, D. (2014). Business Intelligence and Analytics: Systems for Decision Support (10th ed.). New York City: Pearson.

Tyagi, R., Kalish, P., Akbay, K., & Munshaw, G. (2004). GE Plastics optimizes the two-echelon global fulfillment network at its high performance polymers division. *Interfaces*, *34*(5), 359–366. doi:10.1287/inte.1040.0088

Winston, W. L., & Albright, S. C. (2019). Practical Management Science (6th ed.). Boston, MA: Cengage.

Yu, G., Pachon, J., Thengvall, B., Chandler, D., & Wilson, A. (2004). Optimizing pilot planning and training for continental airlines. *Interfaces*, *34*(4), 253–264. doi:10.1287/inte.1040.0082

ADDITIONAL READING

Acito, F., & Khatri, V. (2014). Business Analytics: Why Now and What Next? *Business Horizons*, *57*(5), 565–570. doi:10.1016/j.bushor.2014.06.001

Alpaydin, E. (2014). *Introduction to Machine Learning* (3rd ed.). Cambridge: The MIT Press.

Anderson, D., Sweeney, D., Williams, T., Camm, J., Cochran, J., Fry, M., & Ohlmann, J. (2016). *Quantitative Methods for Business* (13th ed.). London: Cengage.

Druzdzel, M. J., & Flynn, R. R. (2011). Decision support systems. In Understanding Information Retrieval Systems: Management, Types, and Standards. Boca Raton: CRC Press. doi:10.1201/b11499-37

Entezaminia, A., Heidari, M., & Rahmani, D. (2017). Robust aggregate production planning in a green supply chain under uncertainty considering reverse logistics: A case study. *International Journal of Advanced Manufacturing Technology*, *90*(5-8), 1507–1528. doi:10.100700170-016-9459-6

Harris, J. G., & Davenport, T. H. (2017). *Competing on Analytics, Updated, with a New Introduction: The New Science of Winning*. Cambridge: Harvard Business School Press Books.

Karabegovic, I. (2020). Handbook of Research on Integrating Industry 4.0 in Business and Manufacturing (I. Karabegović, A. Kovačević, L. Banjanović-Mehmedović, & P. Dašić, Eds.). Hershey, PA: IGI Global., doi:10.4018/978-1-7998-2725-2

Katok, E., Tarantino, W., & Tiedeman, R. (2001). Improving performance and flexibility at Jeppesen: The world's leading aviation-information company. *Interfaces*, *31*(1), 7–29. doi:10.1287/inte.31.1.7.9690

Srinivasan, G. (2017). Operations Research: Principles and Applications (3rd ed.). New Delhi: PHI Learning.

KEY TERMS AND DEFINITIONS

Business Analytics: A discipline in the management science that focuses on understanding the business performance and developing strategies. It involves the use of technology, skills, and applications to obtain value from data by analytical modeling and quantitative techniques.

GNU Linear Programming Kit (GLKP): A free software package to solve large-scale problems of linear and related programming.

Integrated Development Environment: A type of software that contains all the necessary tools to help the computer programmers create and develop front-end and back-end software in an easy and efficient way.

Mathematical Programming: A branch of applied mathematics concerned with mathematically representing the optimal allocation of limited resources subject to real-life or abstract constraints to reach a pre-defined objective.

Outsource: A practice to issue or contract a part of the work, product, or service to a supplier outside the company, usually as an alternative to in-house production.

Overtime: Time that is worked by an employee in addition to the regular working hours or the payment received for this extra work.

Stock Out: The situation when the product or service that a client demands is not available in the supplier's inventory.

Chapter 8
Changing Entrepreneurship in the Era of Digitalization:
Digital Entrepreneurship in Turkey

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ABSTRACT

The rapid developments in information, communication, and transportation have led to an increase in competition between enterprises. As a result, entrepreneurs striving to survive in the global competition have begun to invest in "digital" competition, which differs from traditional entrepreneurship as it does not require large amounts of capital for its establishment. It enables entrepreneurship to operate all around the world with the internet. This chapter focuses on the differences between digital and traditional enterprises, emphasizing the importance of digital enterprises. According to this purpose, the study employed SWOT analysis to identify Turkish digital enterprises' strengths and weaknesses in relation to the corresponding opportunities and threats.

INTRODUCTION

Due to information becoming increasingly important and widespread and cheap communication technologies, easy access to information and the initiation of using information in production processes has formed the basis of the transition from an industrial society to an information society (Koçak, 2009). Rapid change and developments occurring in information and communication technologies have also led to increased digitalization. With digitalization, the nature of work and work applications in international business have started to change (Ngoasong, 2015). The integration of entrepreneurship and digital technologies (computer, cloud informatics, social media, internet, big data, cyber physical systems, internet of things, 3D printing and analytical data) concepts has developed a new entrepreneurship approach called "digital entrepreneurship" (Delacroix et al., 2019).

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Digital entrepreneurship is a concept that emerged from technological assets like communications and information technology. Generally, any entrepreneurial activity that transfers an asset, service or major part of the business into digital form can be defined as digital entrepreneurship (Kraus et al., 2018). Hence, the digital entrepreneurship approach tends to create new job opportunities based on digital correlativity. In the digitalization process, entrepreneurs' evaluation of fields with increasing opportunity, directing investments and production strategies for the future have great importance in terms of sustaining their future development (Soylu, 2018).

Due to digital entrepreneurship, there are many benefits including economic development and development of the country, ensuring welfare, removal of mediators between producer and customer, increased number of entrepreneurs, rapid access to products by customers, timely responses to the wants and needs of consumers, benefiting from global markets, employing quality workers in operations and increasing entrepreneur profits (Broadband Commission, 2020). For these reasons, digital entrepreneurship is rather important for both developed and developing countries. Especially in developing countries, digital entrepreneurship may be a foundation stone for economic growth and development (Turuk, 2018). The fixed and variable costs which are necessary for product and service production in active business firms with conventional methods are very high in developing countries. Also, there are problems such as having few people with entrepreneurial characteristics or not sufficiently supporting people with entrepreneurial characteristics (Marangoz, 2016). These problems can be minimized thanks to digital entrepreneurship because there is no need to establish a production site, physical materials for production of products or storage of products as in conventional entrepreneurship. Besides, the products and services can reach customers very rapidly and cheaply. Therefore, increasing the number of entrepreneurs with entrepreneurial characteristics who are not active in entrepreneurship due to lack of opportunities, female entrepreneurs and young entrepreneurs from the Y, Z, and Alpha generations, who can use digital technologies very well, will be possible thanks to digital entrepreneurship.

The purpose of the research is to demonstrate the significance of digital entrepreneurship by revealing the differences between traditional entrepreneurship and digital entrepreneurship. Also, the research aims to reveal the current status of digital entrepreneurship, targets for the future and most importantly strong and weak aspects, opportunities and threats. For this purpose, SWOT analysis was employed in the research. SWOT analysis was completed to determine the weaknesses and strengths of digital enterprises that were founded and operate in Turkey along with the opportunities and threats that they have encountered and will potentially face in the future. In the research, the birth, development, and definition of the digital entrepreneurship will be presented. Moreover, the examples of digital entrepreneurship in Turkey and in the world will be presented.

There are numerous studies about digital entrepreneurship in the literature (Cowles, 2015; Davidson & Vaast, 2010; Eleftheriadou, 2014; Mishra, 2010; Özdener, 2018; Soylu, 2018; Turuk, 2018; Vineela, 2019). However, there are no studies regarding strengths and weaknesses, as well as opportunities and threats, of digital initiatives in Turkey. Thus, it is thought that this research will contribute to the relevant literature.

ENTREPRENEURSHIP

Entrepreneurship was described first in the mid-eighteenth century by Richard Cantillon. Cantillon emphasized the risk-taking features of entrepreneurs in his work "Essai Sur La Nature Du Commerce En General", and he defined an entrepreneur as a "speculator in an uncertain environment". The entrepreneur concept was also used by French political economist Jean Baptiste Say. He focused on "in addition to undertaking risk, the entrepreneur is required to organize production factors, and have coordination, supervision and managing qualifications, too" (as cited in Aidis, 2003, p. 3). With his book *The Theory of Economic Development* (1912), Joseph Schumpeter made one of the most important contributions to entrepreneurship by stating that an entrepreneur should be able to bring innovation to the economy. Schumpeter claimed that an entrepreneur is supposed to be a leader as well as an innovator. According to Schumpeter, an entrepreneur does not need to start his own business, as being an innovative leader is sufficient to be a successful entrepreneur. Besides, risk-taking, being part of management or a decision-maker are not prerequisites for entrepreneurial functions (Aidis, 2003).

Today, entrepreneurs are seen as domineering accelerators of change in the business world as they are able to turn something that is perceived as chaos, contradiction or confusion into opportunities while being the most cunning and evasive characters in an economic analysis (Aidis, 2003; Kuratko, 2005). Generally, an entrepreneur is described as an individual who recognizes opportunities where others see chaos, contradiction, or confusion (Aidis, 2003). As to entrepreneurship, it is described as "the process of creating something new with value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting rewards" (Hisrich, 2007, p. 576).

Entrepreneurship is an important source of employment, economic growth and innovation and is an inseparable part of the economic renewal process (Hisrich, 2007). Entrepreneurship is of utmost importance to prosperity and well-being of individuals, families, communities and nations as a whole as it supports innovation and creates new jobs (Hisrich, 2007)

In order for entrepreneurship activities to be successful, successful entrepreneurs are needed. Entrepreneurs need to have a range of characteristics in order for activities to be successful. The most important characteristic of entrepreneurs is that they take "risk" with their activities (Aidis, 2003; Macko & Tyszka, 2000; Norton & Moore, 2006). One needs to have a vision, creativity and willingness to change to be an entrepreneur. It means being energetic, dynamic and passionate about creativity and innovation. It requires taking career-related risks, making the team work effectively and productively, gathering the resources that are needed, making a sound business plan and being able to see the opportunities that others cannot recognize (Kuratko, 2005). Besides, common features that an entrepreneur should have include being a dreamer, having high self-confidence, being a leader (Tyszka et al., 2011), needing high success (Di Zhang & Buring, 2011; Wu et al., 2007), locus of control (Di Zhang & Buring, 2011), having tolerance against uncertainty etc. (Koh, 1996). Due to these characteristics of entrepreneurs, they produce innovative solutions when faced with new situations and can evaluate opportunities formed by the markets (Şeker et al.,, 2016).

Entrepreneurship in The World

Entrepreneurship is an important building block of economic growth and development. If entrepreneurs and ventures did not exist, big innovation, productivity increases and a vast number of new jobs would not be created. Entrepreneurs success does not emerge abruptly. Firstly, entrepreneurs come into existence in their own countries; later, they go on to grow in the international arena (Global Entrepreneurship Index [GEI], 2017). Therefore, they have global qualifications.

With the aim of increasing of the importance of entrepreneurship in the economic growth process, the Global Entrepreneurship Monitor-GEM came into effect in 1997. The first research findings were published in 1999. GEM constitutes a major example of non-profit social entrepreneurship in practice

(Bosma et al., 2019). By evaluating countries within the framework of certain criteria, the GEM publishes entrepreneurship reports related to entrepreneurship activities both on a national basis and also on the basis of comparing world countries (Bilginer, 2017). GEM research includes data on rates of entrepreneurship across multiple phases of the process, characteristics of entrepreneurs and characteristics of their businesses. GEM researches special topics relevant to entrepreneurship in particular (women's entrepreneurship, high-growth-oriented entrepreneurship, entrepreneurship education and training, social entrepreneurship, youth entrepreneurship and entrepreneurship policy etc.) (Bosma & Kelley, 2018).

The Global Entrepreneurship Index (GEI) is an economic activity index prepared by the Global Entrepreneurship and Development Institution (GEDI). GEI is interested in how each country in the world provides resources in order to encourage entrepreneurship. When calculating the GEI, GEM data is used as a basis (Pehlivanoğlu & Kayan, 2019). GEI helps policymakers to show what the strong and weak aspects of their country are in relation to entrepreneurship issues (Ács et al., 2016).

In 2017, four new components were included in the digital entrepreneurship ecosystem: Digital Governance, Digital Marketplace, Digital Business and Digital Citizenship. In 2017 and 2018, GEI presented important information to policymakers and government leaders in world countries in order to strengthen their digital ecosystems, achieve high growth rate and encourage high intensity entrepreneurship (GEI, 2017).

In order to evaluate distribution of entrepreneurship activities based on countries, the country with the highest 10 scores are given in Table 1, according to GEİ in the years 2016, 2017, 2018 and 2019. According to Table 1, the USA is seen as the leader in the world for entrepreneurship in the years 2016, 2017, 2018 and 2019. Switzerland, which was ranked 8th in the global entrepreneurship rankings in the year 2016, made a big leap and was 2nd in 2017. It maintained 2nd place in 2018. While Ireland was ranked 12th in 2016, by advancing four ranks it placed 8th in 2018. While the United Kingdom was ranked 9th in 2016, it advanced five ranks and placed 4th in 2018. Sweden declined to 9th place in 2018, while it was ranked 5th in 2016 (Table 1).

In the global entrepreneurship ranking, from 2017 to 2019, the USA, Switzerland and Canada took the top three places. Holland, which was ranked as 11th in the global entrepreneurship ranking in 2018, was listed among the top ten countries by rising to 8th rank in 2019 (Table 1).

China, India and Tunisia failed to be included in the top ten countries in the global entrepreneurship rankings, but they were countries which made big leaps in entrepreneurship with great developments from 2016 to 2018. Especially, China is becoming the leader of digital entrepreneurship in the world. According to the global entrepreneurship index, India made the biggest leap in the entrepreneurship ranking; while it was ranked 98th in 2016 (GEI = 24.9), it elevated to 68th place in 2018 (GEI= 28.4). Likewise, Tunisia also made the second biggest leap and reached 40th place in 2018 (GEI= 42.4), while it was ranked 62nd in 2016 (GEI= 34.4). However, both India and Tunisia dropped to lower ranks in the global entrepreneurship index in 2019. China, the world's second largest economy, rose by 17 ranks from 2016 to 2018, placing 43rd and then 34th in 2019. In 2018, Taiwan, the highest ranked Asian country was 18th place, and Singapore at 27th rank surpassed Japan in the entrepreneurship ranking. In 2019, while Taiwan was ahead of Japan in the entrepreneurship ranking, Singapore remained 27th and lagged behind Japan. Japan moved up two steps and ranked 26th in 2019 (Ács et al., 2016; Ács et al., 2018; Ács et al., 2019). In 2019, Hungary displayed a high entrepreneurial performance, rising from 50th to 33rd place in the global entrepreneurship ranking. Pakistan, Bangladesh, Uganda and other poor African countries are at the bottom of the entrepreneurship rankings and are among the countries with least instability in entrepreneurship performance (Ács et al., 2019).

Table 1. Top 10 Countries in 2016, 2017, 2018 And 2019 Global Entrepreneurship Index

Country	GEI 2016	Listing 2016	GEI 2017	Listing 2017	GEI 2018	Listing 2018	GEI 2019	Listing 2019
USA	86.2	1	83.4	1	83.6	1	83.6	1
Canada	79.5	2	75.6	3	79.2	3	79.2	3
Australia	78.0	3	72.5	7	75.5	5	74.3	6
Denmark	76.0	4	74.1	5	74.3	6	77.8	4
Sweden	75.9	5	75.5	4	73.1	9	73.1	9
Taiwan	69,7	6	60,7	16	59,5	18	62.2	18
Iceland	68.9	7	73,5	6	74,2	7	74.2	7
Switzerland	67.8	8	78,0	2	80.4	2	80.4	2
United Kingdom	67.7	9	71.3	8	77.8	4	75.5	5
France	66.4	10	64.1	12	68.5	10	68.5	10
Ireland	65.6	12	71	9	73.7	8	73.7	9
Netherland	65,4	13	67,8	10	68,1	11	73.7	8

References: Ács et al., 2016; Ács et al., 2017; Ács et al., 2018; Ács et al., 2019.

DIGITAL ENTREPRENEURSHIP

With the simplest meaning, digitalization is "the adoption or increase in use of digital or computer technology by an organization, industry, country, etc." (Brennen & Kreiss, 2016, p. 556).

The digitalization process in businesses begins with the use of computers managing digital data. Digitalization firstly occurs as automation of work processes with the use of software systems and then causes changes to the working model of businesses with support from a variety of digital technologies developing on the internet (Kleín, 2020).

The digitalization process in business began to be called digital transformation encompassing all work processes, work models and organizational structures in the business (Kleín, 2020). In a general sense, digital transformation can be defined as "the modification (or adaptation) of business models, resulting from the dynamic pace of technological progress and innovation that triggers changes in consumer and social behaviors" (Kotarba, 2018, p. 123). Digital transformation causes a radical transformation in the operation, culture, technological and management strategy of business together with technical developments (Savic, 2019). Therefore, with digitalization, the understanding of business (company) has changed; now, businesses started to move from traditional business to digital business. For example, in the economy linked to networks supported by digital technologies, many companies have begun to reduce in size and one-person companies and partnerships have proliferated. New digital technologies (cyber physical systems, internet of things, cloud computing, big data, robots, 3D printers etc.) creating digital transformation strengthen the digital economy creating important potential work opportunities and significantly reducing the cost of new enterprises. Using new digital technologies, Alibaba.com, which created many jobs and assisted millions of Chinese people to become entrepreneurs, can be given as a good example of this new entrepreneur understanding; in other words, digital entrepreneurship (Zhao & Collier, 2016). As a result, digital entrepreneurship is the intersection of digital technologies with entrepreneurship. In this sense, digital entrepreneurship is a digital perspective on entrepreneurship.

Currently digital entrepreneurship is more advantageous compared to entrepreneurship in the 1990s. Digital entrepreneurs at present have new digital technologies, customers and businesses have more desire to use new digital products or services and qualified workers see entrepreneurship as a career opportunity (Du et al., 2018).

Digital entrepreneurs are often defined as young, well-educated and urban opportunity-oriented entrepreneurs who benefit from effective social networks and a combination of up-to-date technical and business skills. (Delacroix et al., 2019). Digital entrepreneurs are entrepreneurs who try to seize opportunities and while doing this, they use digital media and information technologies (Kraus et al., 2018: 4). Digital entrepreneurs are people who can use digital technologies very well, work in uncertain environments, are patient, ambitious, have business intelligence, high imagination, are resilient, researchers, know the market and customer well, and can take risks (Özbek et al., 2018). Therefore, digital entrepreneurs are engaged in digital entrepreneurship activities by using digital technologies in the digital field.

Digital entrepreneurship is an approach increasing by means of technological media such as internet, information and communication technologies. Generally, any entrepreneurial activity which transfers a medium, service or major part of the business into the digital environment can be described as digital entrepreneurship (Kraus et al., 2018). In other words, digital entrepreneurship encompasses transformation via new digital technologies in all new enterprises and existing businesses (Eleftheriadou, 2014). Digital entrepreneurship is described as the practice of pursuing "new venture opportunities presented by new media and internet technologies" (Ngoasong, 2015, p 3). Digital entrepreneurship was described by the European Commission (as cited in Zhao & Collier, 2016):

"Digital entrepreneurship embraces all new ventures and the transformation of existing businesses that drive economic and/or social value by creating and using novel digital technologies. Digital enterprises are characterized by a high intensity of utilization of novel digital technologies (particularly social, big data, mobile and cloud solutions) to improve business operations, invent new business models, sharpen business intelligence, and engage with customers and stakeholders. They create the jobs and growth opportunities of the future" (p. 2176).

Digital entrepreneurship was described as follows; "digital entrepreneurship is a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organization has been digitized" (Hull et al., 2007, p. 5). Thus, digital entrepreneurship implies entrepreneurship, or new value creation, involving digital goods or services, digital distribution, a digital workplace, a digital marketplace, or some combination of these. This entrepreneurial activity relies on information technology to create markets, distribute, transform or (in the case of digital services) offer the product (Turuk, 2018). Without information technology, digital entrepreneurs would be unable to deliver their products or services and in some cases the product or service itself could not exist without information technology. Digital entrepreneurship thus exists on the cusp of two disciplines: management (particularly entrepreneurship) and information systems (Kamalian et al., 2016).

Several companies initiated digital business by selling their goods online in order to meet the competition in the market. As this became a need, the concentration on how to start a business venture is growing with ultimate importance. People who want to start a digital business need to clearly know the difference between digital entrepreneurship and traditional entrepreneurship, along with opportunities, downfalls and obstacles in digital entrepreneurship (Vineela, 2018).

Differences Between Traditional Entrepreneurship and Digital Entrepreneurship

Digital enterprises have different features compared with traditional entrepreneurial ventures due to having different business models. They can monitor and maintain their products, marketing and distribution activities by using digital platforms. Digital entrepreneurship ventures range from large “established firms that develop hardware, software, and networking technologies” to small startup firms that use information and communication technologies (ICTs) so that they can perform their businesses activities (Ngoasong, 2015).

One factor that can be different between digital and traditional entrepreneurship is the workplace (Hull et al., 2007). Establishing a digital venture is easier than establishing a conventional venture. Whereas a workplace where production is completed is required in a conventional venture, there is no need for any place in order to complete production in digital business firms (Vineela, 2018). When products and services can be digitized, the need for a physical collocated work team decreases (Hull et al., 2007). Besides, time-savings are provided. For instance, time spent establishing a web site which sells the existing product and services is shorter than time spent establishing a conventional business (Vineela, 2018).

Digital entrepreneurship has more convenience than conventional entrepreneurship in terms of getting into the market. For instance, big digital ventures such as eBay or Amazon allow the use of their platforms so that small entrepreneurs can realize their dreams. The opportunity for people is provided in a short time to create small firm ventures (Vineela, 2018).

There are lower production costs and less storage in digital entrepreneurship than in conventional entrepreneurship. During the production process for digital products, there is no need for any physical equipment for production or space for storage. This is named ‘just in time’ production which saves various costs related to conventional entrepreneurship (Vineela, 2018).

One major difference between digital entrepreneurship and traditional entrepreneurship is how marketing activities are performed. While products or services are marketed in a place in conventional business firms, they are marketed on the web in digital business firms (Hull et al., 2007). Digital entrepreneurs reach international markets easily. However, there is a lot of competition in international markets. Therefore, digital entrepreneurs should meet the needs of customers and for this reason they should work 24 hours 7 days a week in order to be successful among the global competition (Vineela, 2018). Because the working environments of digital enterprises have a more flexible structure, it is more suitable for Y and Z generations than traditional enterprises. Therefore, undesirable circumstances like work stress, conflicts and absenteeism may not occur for individuals working in digital enterprises compared to those working in traditional enterprises. Since digital initiatives benefit from digital technologies, the distribution of their products and communication with customers or communication of customers with each other happens faster. These days when we live in COVID-19 pandemic, digital initiatives are a more suitable form of business to reduce the spread of the pandemic and the negative impact of the virus compared to traditional initiatives.

Examples of Digital Enterprises in the World

Recently, there are an increasing number of digital enterprises operating successfully all around the world. These enterprises make use of various technologies and operate in many sectors, including information, entertainment, social network websites, computer software, mobile software, education and counselling, and the food industry (Özbek et al., 2018). Other entrepreneurs that utilize traditional methods all over the world are also inclined to benefit from digital technologies that will help them maximize their profit while minimizing costs and time. Therefore, they invest more in digital technologies, which require them to adapt their traditional way of working or organizational structures and accommodate digital enterprise procedures (Koçak, 2009). Entrepreneurs have been transferring their investments to countries that provide the most productive ecosystems and the arrangements needed for innovation and digital enterprises. The entrepreneurs in the United States, Canada and United Kingdom are often equipped with skills for the effective use of the internet and information technologies as well as strategic business acumen, whereas in China and other developing countries in Southeast Asia, people invest in digital enterprises to take the advantage of information and communication technologies by better interpreting local and national needs (Koçak, 2009).

Digital entrepreneurs have caused substantial changes in business and astonished the world throughout the last decade. They have redefined traditional business methods, goods and services. Digital enterprises such as Google, Facebook, Microsoft, Twitter and Apple have not only changed the business world but also reshaped everyday life (Kraus et al., 2018).

Digital entrepreneurs and existing entrepreneurs who work with conventional methods have started to benefit from advantages that digital environment provide differently in different regions of world, as well. For this reason, they shift their investments to either digital technologies or they use these technologies efficiently in their work processes (Koçak, 2009).

Facebook*:* Facebook is one of the main leaders in the textual and interactive media environment where users can see and interact on the website and on mobile media (Brügger, 2015). Facebook was established in February 2004. Facebook.com web services were first opened to serve students in Harvard University (Linke, 2011). Facebook allowed Harvard students to create a profile page containing personal information and to communicate with each other. A short time after the web site was published, Facebook opened for use by all students in America from middle school to university. Later Facebook began to open for all educational organizations outside the USA. Since 2006, it has spread around the whole world outside of the academic world (Brügger, 2015). Facebook users can create accounts including personal information, interests, photos and etc. and they can become friends with other users of the website. Furthermore, they can make connections through various activities such as posting on friends' walls, leaving comments on links, participating in forum discussions and "liking" brands. Facebook helps people to create or pursue social capital, to communicate with others, keep up with others' lives and to discover gossip and rumors (Smith et al., 2012).

Airbnb: Airbnb, founded in San Francisco in 2008, is a web application that provides the largest accommodation service in the world. Airbnb is a marketplace in which hosts rent their flats/houses to people in need of accommodation for a short time. The communication and payment procedures between hosts and guests are carried out on this platform. Airbnb not only helps hosts to gain extra income but also provides cheaper -compared to hotels- accommodation opportunities for guests. Airbnb has international qualifications since it enables hosts to rent rooms in their ordinary properties or even their houses to guests all over the world (Henama, 2018).

Alibaba.com: Alibaba.com was established in 1999 in China. Alibaba Group Holding Ltd. is the leading e-trade company for retail and wholesale comprising the largest global electronic market. Alibaba provides small and medium-sized enterprises with various business opportunities to help them benefit from innovative technologies and participate in domestic and global competition in a more productive way. There are more than 30 million active users in more than 240 activities (Yazdanifard & Li, 2014).

Google*:* Google was established in 1998 in the U.S.A. Google is a search engine where users can find and access open web resources. It provides a variety of search-related services, from news to maps, from shopping to scholarships. It builds both electronic and shared use space within the company. It creates temporary shared space where customers can test beta versions of their products via web and e-mail (Turner, 2019). The company provides services such as electronic g-mail by means of social networks. Moreover, it offers several services such as documents, photos, books, email, YouTube videos, and cloud storage. Hence, it connects many independent systems to a robust and reliable network at the information content level (at least from the user's perspective) using open Web protocols. Also, it is widely accessible (Plantin et al., 2018).

eBay: eBay is a digital enterprise founded in 1995 and based in the USA. eBay facilitates consumer-to-consumer and business-to-consumer trade through their website. eBay is an open bidding system where people and companies buy goods and services online (Hasker & Sickles, 2010). Thanks to eBay, individuals have the possibility to get or purchase products they need or want through online auctions without travelling or searching for them through means such as garage sales, collections shows, flea markets and more. eBay facilitates and globalizes conventional person to person trading traditionally carried out through a web interface. The website is free for consumers; however, a small fee is charged for the transaction between consumers and dealers (Mishra, 2010).

Amazon: Amazon is an online retailer and service provider for retailer websites. It offers customers a wide range of products including books, clothing, electronics and other goods, via its website. In addition, it offers services to third-party sellers and web services for marketing, promotion and developers. Third-parties can sell their products on the website using Amazon services (Cowles, 2015).

eHarmony: eHarmony was founded in 2000. The firm is one of the biggest dating services since 2000 based on registered clients and revenues. As a leading dating service, eHarmony had an unique means-end process to find partners for romantic affairs online. While other services were based on posting user profiles or browsing other users' profiles, eHarmony used a detailed questionnaire to create a user profile, which formed the basis of a proprietary algorithm used for searches to find the most suitable potential partners. Users pay a monthly fee and are vetted online before they start face-to-face contact. eHarmony's business entrepreneurship is based on IT which enables users to access the questionnaire online and offers online payment and a database of subscribers which are matched based on computerized algorithms (Davidson & Vaast, 2010).

WeChat; WeChat has become one of the most popular social media platforms recently. It has users from Asia to Europe. WeChat was launched by Tencent -a multinational company in China-in 2011. It is now one of the most widely used applications on smart phones with more than one billion active users. When it was first launched in 2011, it just offered texting and voice message functions. However, its service has expanded since then. Today, in addition to texting, voice or video calls, it serves a range of functions like sharing photos/videos, sending locations, booking flights, shopping, playing games, and paying invoices (for taxis, restaurants, clothing, supermarkets, traffic fees etc.) (Montag et al., 2018).

Apart from these, there are many successful companies in terms of digital transformation, such as Netflix, Uber, Skype, Twitter and Apple.

DEVELOPMENT OF ENTREPRENEURSHIP IN TURKEY

It is possible to say that entrepreneurship history dates back a thousand years in Turkey. Turks made considerable progress in terms of trade, especially in crafting issues, since they came from Central Asia and settled in Anatolia and thereby transitioned to settled life from a nomadic society. Indeed, the Ahi Community, which was an organization between tradesman and craftsman, was rather effective and successful in the time of the Seljuk Empire and the establishment of the Ottoman Empire. However, later in the Ottoman Empire, non-Muslims were engaged in trading. As for Turks, they were employed in military service, ulema, bureaucracy, agriculture and husbandry instead of trading. Therefore, a Turkish entrepreneur class was not created and entrepreneurship could not develop (Durukan, 2007). In the first years when the Turkish Republic was established after the Ottoman Empire, entrepreneurship transformed considerably and began to show a tendency similar to the entrepreneurship structure in western and developed countries. Within the framework of policies in the Republic and later period, entrepreneurs gained competitive power gradually in the domestic market and began to export (Cansız, 2013).

In the period between 1930-1950, a statist policy targeting government investment was pursued in fields where the private sector was inadequate. In spite of this, in this period, private entrepreneurship was supported and the private sector progressed visibly in industry compared with the 1920s. In the 1950s, new business firms were established and special weight was given to entrepreneurship. Being many business firms active today were established in this period. Many incentive policies for entrepreneurship were implemented in this period. Between 1960 and 1970, private entrepreneurship made progress. Between 1970 and 1980, tendencies toward industrialization and private sector entrepreneurship increased (Marangoz, 2016). 1980 was a year when studies intensified about privatization of public enterprises and shrinking of government volume, notably in Europe countries. In 1980, some decisions were made economically in Turkey. These decisions were to transition to a free market economy, to give permission for foreign capital inflows, to decrease intervention of government in the economic field and to provide capital stock in the private sector (Candan, 2011). In the 1980s, entrepreneurship gained speed by means of the transition to the free market economy and adopting an outward oriented growth model (Tatar, 2018). In the 1980s, entrepreneurship and being a business man began to be preferred as an occupation among the young. In these years, also the other developments regarding entrepreneurship were support policies especially for entrepreneurship related to exports. In 1980 and following years, important developments occurred for the entrepreneurship issue in Turkey and Turk entrepreneurs began to learn about markets, quality and competition (Marangoz, 2016). In the 2000s, developments emerged in the science and technology fields which increased the importance of entrepreneurship gradually (Öztürk & Arslan, 2016).

Entrepreneurship in Turkey in 2000s

Previously "big fish ate little fish", but we are currently in a world where "fast fish is eating big fish". By moving fast, developing new technologies, and producing different products, firms reach different positions. In digitalization and technologic development, 'speed' and 'agility' are the most important factors (Öztürk & Koç, 2017). Together with the increasing speed of the globalization period, almost no business can avoid global competition in an economic system where inter country boundaries disappear. This period is also valid for the Turkish economy and Turkish entrepreneurs. For this reason, with the aim of developing the entrepreneurship activities and also supporting entrepreneurs, new actions were been in the entrepreneurship field, especially in recent years, in Turkey with the contributions of both government and private sector, and this period was eased by removing the obstacles to entrepreneurs. By these means, various arrangements were made in order to increase the number of entrepreneurs. In Turkey especially in recent years, together with understanding of entrepreneurship's importance for the national economy, major developments were provided regarding entrepreneurship activities thanks to both utility programs for entrepreneurs and entrepreneurship encouragement programs (Konak, 2019). However, according to the GEI index, Turkey did not show the expected success in entrepreneurship. According to the 2016 Global Entrepreneurship Index, Turkey ranked 28th with 52.7 points among 137 countries. The highest scores were obtained from "High Growth", "Risk Capital" and "Product Innovation" criteria, respectively, whereas "Opportunity Startup" got the lowest score (Ács et al.,, 2016). However, Turkey ranked 35th with 43.7 points among 137 according to 2017 GEI. The highest scores were for "Risk capital" followed by "High Growth" and "Product Innovation", respectively, while "Risk Acceptance" had the lowest score (Ács et al., 2017). In 2018, Turkey ranked 37th with 44.5 points among 132 countries. The highest scores were obtained from "Product Innovation", "High Growth", "Startup Skills" and "Risk Capital" criteria, respectively, whereas "Risk Acceptance" got the lowest score (Ács et al., 2018). Turkey is in 6th rank among top 10 countries experiencing the highest decline in the 2019 GEI index. In the GEI index, Turkey dropped to 44th place with 39.8 points, a decrease of -4.7 from 2018 to 2019 (Ács et al., 2019). Therefore, it can be said that entrepreneurship activities contribute to the development of the national economy too little in Turkey compared with other countries. The reasons why Turkey experienced reductions in entrepreneurship are thought to be low income, R&D expenses and minimum education level. Although there were positive developments about increases in R&D expenses and half of these expenses being met by trading corporations, R&D expenses still are not sufficient in Turkey (Pehlivanoğlu & Kayan, 2019). These days when we live in Industry 4.0, increased R&D expenses are required and entrepreneurs should be supported so that Turkey can be included in Industry 4.0 and can increase the number of digital entrepreneurs who can use digital technologies.

Digital Enterprises in Turkey

In the 2000s, the importance of entrepreneurs and entrepreneurship in society was increased by the developments emerging in science and technology, and the individual entrepreneurship conception developed. Besides, the importance of innovation and creativity conceptions has begun to rise gradually. In the 2000s, a new entrepreneurship conception and need emerged in the world and Turkey: e-entrepreneurship or digital entrepreneurship (Marangoz, 2016).

The use of the internet began to increase with each passing day around the world and in Turkey. Currently, the internet has become functional for many processes like chatting, learning new things, education, shopping, some public processes and distance working. At the end of the 1990s in Turkey, digital enterprises began to sell over the internet. In 1998 Hepsiburada and in 2000 Gittigidiyor began selling on the internet. Yemeksepeti is one of the pioneer digital enterprises in Turkey. In addition to these digital enterprises, shopping sites targeting internet shopping for women like Morhipo, Trendyol and Tozlu.com were created (Özdener, 2018). Some of digital enterprises in Turkey include the following:

Yemeksepeti.com was founded in 2001 for online food ordering and take-away food. It is a platform and an e-commerce model pairing up restaurants and people who want to order food online successfully. Users can access the menus of the contracted restaurants and order food in an easy and fast way without being charged for the service. The company charges a certain commission from contracted restaurants for orders (Öztaş, 2009). Yemeksepeti serves all users within the framework of the opening hours of restaurants in their portfolio (Yemeksepeti, 2019). One of the largest internet sites in Turkey, Yemeksepeti was bought by one of the world's largest online food ordering platforms of Delivery Hero in 2015 ("Milliyet", 2019). Yemeksepeti, designed in accordance with the working conditions of the new generation, ensures a comfortable working environment for workers. For this, they offer a working environment with home comforts like rest areas to relieve stress, sleep rooms, gyms, billiard tables and library ("Yemeksepeti", 2019).

Mutlubiev: Mutlubiev was founded in 2014. It is an online platform providing cleaning services for homes and offices. There are more than 100,000 cleaning professionals experienced in cleaning. Most employees of Mutlubirev are women ("Mutlubiev", 2020).

Trendyol: Trendyol was founded as a retail shopping website in 2010 in Turkey. Trendyol was the first website offering products from Turkish designers for sale on the internet. Due to clickable videos, customers can easily order and buy products they like (Dal & Şahin, 2018[REMOVED HYPERLINK FIELD]). Trendyol delivers products from various categories such as electronics, home and furniture, food, mother-child, cosmetics, and market products, in addition to fashion. It carries out work for the digital transformation of SMEs. Also, Trendyol contributes to the struggle against social problems. For example, during the COVID-19 pandemic, it supplied materials and equipment to the Ministry of Health and supported various SMEs to conduct sales in Trendyol. In order for the products to reach the customers faster, it established Trendyol Express, a delivery network ("Wikipedia", 2019). Trendyol is an e-commerce website adopting a service understanding to create the best customer experience. Trendyol is one of the first websites in Turkey to receive the highest security certificate making online shopping secure. Additionally, with the same security system as Trendyol, the Facebook e-shop ensures members can shop without leaving Facebook (Dal & Şahin, 2018[REMOVED HYPERLINK FIELD]). Alibaba Group, one of the world's leading e-commerce groups, became a partner of Trendyol in 2018. With more than 16 million customers today, Trendyol has a very important place in the e-commerce market with rapid growth in Turkey and surrounding regions and further growth potential ("Trendyol", 2019).

Hepsiburda.com; Hepsiburda.com was established in 1998. The company started its activities with a B2C (Business to Customer) e-commerce model for a wide range of products. Hepsiburda.com conducts sales over the internet with a variety of products ranging from electronic goods to clothing. With Hepsiexpress, deliveries are made instantly for supermarket shopping. Delivery of products is ensured in a very short time with both its own delivery network (HepsiJet) and different delivery networks (Özeroğlu, 2018).

Apart from these, there are many successful digital initiatives operating in Turkey, such as Getir, Onedio, N11, GittiGidiyor etc.

METHOD

The research aims to reveal the current status of digital entrepreneurship, targets for the future and most importantly strong and weak aspects, opportunities and threats with the SWOT analysis method.

SWOT analysis is "an effective way of gathering and classifying information, illustrating particular matters, and generating strategic planning ideas for a business" (Machmud & Sidharta, 2014, p. 54). SWOT analysis, or classifying issues into strengths, weaknesses, opportunities, and threats, is one of the most common tools for strategic planning. SWOT analysis is a beneficial strategic tool to fill gaps in the evaluation of economic conditions facing an entity as well as to categorize internal variables. SWOT analysis not only assists in the identification of environmental relationships but also the development of suitable paths for countries, organizations, or other entities to follow (Helms et al., 2011). The aim of SWOT analysis is to analyze the strong and weak aspects, opportunities and threats of an organization/sector/region during planning and to develop plans and strategies for the future (Yalçınkaya, 2017: 301). There are four alternative strategies that can be suggested: Strengths-Opportunities Strategy (SO), Weaknesses-Opportunities (WO), Strengths-Threats Strategy (ST), and Weaknesses-Threats Strategy (WT) (Machmud & Sidharta, 2014; Sudrajat et al., 2016).

- SO Strategy: Strategies developed for the enterprise to use its existing strengths to benefit from external opportunities.
- ST Strategy: Strategies developed to minimize external threats by leveraging the strengths of the enterprise
- WO Strategy: Strategies developed to minimize the existing weaknesses of the enterprise by utilizing external opportunities.
- WT Strategy: Strategies developed to minimize the existing weaknesses of the enterprise and prevent any threats.

According to these strategies, an example of a 2x2 SWOT analysis matrix is shown in Table 2.

Table 2. Analysis Matrix Example

Internal Factors / **External Factors**	**Strengths (S)**	**Weaknesses (W)**
Opportunities (O)	SO Strategy	WO Strategy
Threats (T)	ST Strategy:	WT Strategy

References: Machmud & Sidharta, 2014; Sudrajat et al., 2016

SWOT ANALYSIS

Exhibiting the existing situation of Turkey on entrepreneurship, a literature review was completed and this was explained in the chapter titled development of entrepreneurship in Turkey. In light of the findings obtained from the literature review (Marangoz, 2016; Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı [KOSGEB], 2019; Pehlivanoğlu & Kayhan, 2019; Ulusoy et al., 2017), SWOT analysis was carried out to display Turkey's strengths, weaknesses, opportunities that will affect entrepreneurship positively, and factors that threaten or may threaten the growth and development of entrepreneurship (Table 3).

Using SWOT analysis data for digital entrepreneurship, the SWOT analysis matrix was created. As can be seen in Table 4, digital entrepreneurship strategies for the future were determined in the 2x2 matrix.

In order to increase digital entrepreneurship in Turkey, a digital inclination is required starting from the first stages of formal education and the education system should be changed in favor of the digitalization period. In order to educate students to have the capability to use digital technologies, firstly training should be provided about digitalization for educators. In secondary education and earlier, basic concepts and abilities should be included in the education period, required concepts and abilities in different areas of professions should be handled within the scope of higher education (universities and vocational high schools). For instance, lessons such as software literacy and coding ability have begun be included in the curriculum in some countries (England, Estonia, Portugal, Denmark etc.) from the first years of primary education. In this way, the generation who will study creatively in the future fields of artificial intelligence, machine learning, interaction between humans-robots and data science will have acquired the information and skills such as optimization and software engineering required for studying in these fields from a very early age (Ulusoy, et al., 2017).

Table 3. Swot Analysis

Strengths	Weaknesses
- The existence of entrepreneurial people with a young and dynamic structure - The existence of entrepreneurial people in the digital generation who can use technology well - The existence of people in generation Z who can be entrepreneurs of the future newly entering business life, with analytical intelligence and skills, who can use technology very well - Young entrepreneurs receiving good education - Young entrepreneurs associated with foreign entrepreneurs in foreign markets (people in generation Y) - Digital working environment - Comfortable working environment for employees - High number of members - Being a newly developing sector - High customer potential - Customer addiction - Competitive advantage - Easier set up compared to conventional businesses - Strong brand image - Service in a short time	- Not passing the technological accumulation down from generation to generation - The majority of the population do not find it safe to order online in general - Limited access to generation X and previous generation consumers who do not use technology - Phone order preferences of most customers - Inadequate services of companies that are members of digital initiatives
Opportunities	**Threats**
- Collaboration of small and medium sized businesses (SMEs) and big businesses with development agencies and chamber of industries - For entrepreneurs and entrepreneurial candidates, ‘entrepreneurship trainings’ provided by various institutions (KOSGEB, Chamber of Industry, universities, development agencies etc.) - In universities, mandatory teaching of “practical entrepreneurship” lessons or teaching as mandatory elective course - Having a large internal market - Turkey’s position near the European and Asian markets - Support of R & D activities by the government in recent years - Support of entrepreneurship by the government - Tendency toward digital use by new generation Y and Z - Increasing digitalization due to COVID-19 pandemic - Increasing internet addiction in consumers - Excellent work by logistics channels in Turkey - Unsatisfied / insatiable customer potential	- Lack of finance and not providing sufficient finance from private banks - Insufficiency of credit opportunities - High loan rates - Not supporting entrepreneurs financially through craftsman’s cooperatives - Lack of skilled labor and high cost of employment - Lack of supports encouraging R&D activities in the private sector - High inflation - Too many bureaucratic formalities - Difficulties in the period of establishing and liquidation of company and high costs because of this - Insufficiency of digital technology - Insufficiency of the education of older generation entrepreneurs - Not conducting market research - The emergence of new competitors - Unrecorded production - Insufficiency of digital infrastructure - Ban on the use of digital initiatives in some countries - Presence of strong international digital initiatives - Few digital entrepreneurs in Turkey

References: Marangoz, 2016; KOSGEB, 2019; Pehlivanoğlu & Kayhan, 2019; Ulusoy et al, 2017.

Table 4. Swot Matrix Strategy Components for Digital Entrepreneurship

Internal Factors / External Factors	Strengths (S)	Weaknesses (W)
Opportunities (O)	-Focus on advertising campaigns. - New products or services should be launched by taking advantage of the unsatisfied customer potential.	-The digital infrastructure of regions lacking digital opportunities should be improved. -Training about digitalization, digital technology and digital entrepreneurship should be provided by various institutions to both traditional and young entrepreneurs
Threats (T)	-Cooperative bank should be established and thus digital entrepreneurship activities of young people should be supported financially. -Establishment of digital initiatives should be encouraged by removing bureaucratic barriers.	-More emphasis should be placed on major international digital initiatives and joint ventures. - R&D studies should be encouraged by digital enterprises and large enterprises in order to ensure the quality standards of SMEs who are members of digital initiatives.

CONCLUSION AND RECOMMENDATIONS

Entrepreneurship is quite important for increasing competitiveness in the market, creating new investments and employment opportunities, revival of the economy and providing of sustainable development. Today, thanks to digital technologies, the entrepreneurship concept is changing rapidly and has started to shift towards the digital entrepreneurship concept by moving away from the traditional entrepreneurship concept. Especially due to the continuous change and renewal processes, the number of digital entrepreneurs has increased nowadays. Digital entrepreneurs are people who can see every opportunity related to information technologies and can actualize these opportunities rapidly in today's virtual organizations. Digital entrepreneurship seeks opportunities by using digital media and other information and communication technologies (Aracıoğlu et al., 2016). In other words digital entrepreneurship ensured everything is performed in the digital environment from production to marketing.

In this research, examples of digital entrepreneurship being established by means of digitalization were given.

The businesses which form the subjects of the research have a faster, more flexible and more cooperation inclined business approach thanks to information, communication and digital technologies. In these firms, everything is performed in the digital environment from production to marketing. These firms are enterprises that do not have rigid procedures and bureaucracy. Additionally, these firms provide flexible working hours, remote working possibilities by mobile phone without being dependent on an office, relaxed clothing for employees and a comfortable work area. Therefore, while conflict, work stress and intention to leave at the job are less, organizational commitment, job satisfaction, job performance, intention to stay at the job and motivation are increased.

Entrepreneurs continuing activities with traditional methods should take into consideration the opportunities that digital technologies will create and should use digital technologies in order to compete. These entrepreneurs should adjust their organizational structures, processes and business models to today's digital era conditions. Workplace conditions should be made suitable and more comfortable without bureaucracy for Y and Z generations who are today's employees and for the Alpha generation who will be employees in the future.

In the establishment of digital ventures, there is no need for as much capital as required for the establishment of a conventional venture. When viewed from this aspect, digital entrepreneurship is rather advantageous for people who use technology well and will start entrepreneurship in Turkey. Especially in terms of women entrepreneurs, digital entrepreneurship is more advantageous than conventional entrepreneurship.

When digital venture examples are examined, Turkey falls behind very much in digital entrepreneurship issues due to having few digital ventures. Therefore, digital entrepreneurship should be encouraged. In order to develop digital entrepreneurship, R&D expenses in the private sector should be increased. For R&D investments, entrepreneurs should be supported by the government both technically and financially. Digital generations who can use technology well should be trained about digital entrepreneurship issues and these generations should be encouraged so that they can become digital entrepreneurs and supports should be given both by various institutions (KOSGEB, Chamber of institutions, development agencies etc.) and the government. Digitalization or digital entrepreneurship should be given more weight in universities, vocational schools and high schools. Besides, education system should be changed in favor of Z and Alpha generations.

The current study has some limitations, such as including only Turkish enterprises. Future research may focus on developing countries that are prominent in digital enterprises.

FUTURE RESEARCH DIRECTIONS

The current study may contribute to future research by bringing a new perspective to digital enterprises. In addition, the current and future entrepreneurs may gain strategic plans to see possible opportunities and threats by making use of the SWOT analysis.

REFERENCES

Ács, Z. J., Szerb, L., & Autio, E. (2016). *The Global entrepreneurship index 2016*. The Global Entrepreneurship and Development Institute. doi:10.13140/RG.2.2.17692.64641

Ács, Z. J., Szerb, L., Autio, E., & Lloyd, A. (2017). *The Global entrepreneurship index*. The Global Entrepreneurship and Development Institute. doi:10.1007/978-3-319-63844-7_3

Ács, Z. J., Szerb, L., Lafuente, E., & Márkus, G. (2019). *The Global entrepreneurship index*. The Global Entrepreneurship and Development Institute. doi:10.13140/RG.2.2.17692.64641

Ács, Z. J., Szerb, L., & Lloyd, A. (2018). *The Global entrepreneurship index*. The Global Entrepreneurship and Development Institute. doi:10.13140/RG.2.2.17692.64641

Aidis, R. (2003). *Entrepreneurship and economic transition*. Tinbergen Institute discussion paper. http://www.tinbergen.nl

Aracıoğlu, B., Demirhan, D., Tatarlar, C. D., & Zalluhoğlu, A. E. (2016). Tüm boyutlarda girişimcilik. In A. Ö. Dedeoğlu (Ed.). *Hümanist Kitap Yayıncılık* [Lexical characteristics of Turkish language]. Academic Press.

Bilginer, F. (2017). Within the framework of the global entrepreneurship index the global entrepreneurship development in Turkey: A Theoretical Perspective. *Uluslararası Ticaret ve Ekonomi Araştırmaları Dergisi*, *1*(1), 29–46. doi:10.30711/utead.310378

Bosma, N., Hill, S., Ionescu-Somers, A., Kelley, D., Levie, J., & Tarnawa, A. (2019). Global entrepreneurship monitor (GEM) 2019/2020 Global Report. Academic Press.

Bosma, N., & Kelley, D. (2018). *Global entrepreneurship monitor (GEM) 2018/2019 Global Report*. Gráfica Andes.

Brennen, J. S., & Kreiss, D. (2016). Digitalization. In K. B. Jensen, E. W. Rothenbuhler, J. D. Pooley, & R. T. Craig (Eds.), *The International Encyclopedia of Communication Theory and Philosophy* (pp. 556–566). Wiley-Blackwell. doi:10.1002/9781118766804.wbiect111

Broadband Commission. (2020). *Digital entrepreneurship*. https://www.broadbandcommission.org/workinggroups/Pages/Digital-Entrepreneurship.aspx

Brügger, N. (2015). *A brief history of Facebook as a media text: The development of an empty structure*. doi:10.5210/fm.v20i5.5423

Candan, H. (2011). Osmanlı'dan Günümüze Türk Topraklarında Girişimcilik Serüvenine Dair Bir Değerlendirme. *Kahramanmaraş Sütçü İmam Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *1*(2), 157–174.

Cansız, M. (2013). *Türkiye'nin yenilikçi girişimcileri: teknoloji geliştirme bölgeleri örneği, sosyal sektörler ve Koordinasyon Genel Müdürlüğü Araştırma Geliştirme ve Girişimcilik Daire Başkanlığı* (Publication No: 2850) [Lexical characteristics of Turkish language]. Türkiye Cumhuriyeti Kalkınma Bakanlığı.

Cowles, B. (2015). *Question mark culture: how culture affects entrepreneurship at Amazon* [Unpublished doctoral dissertation]. Christian University, Texas.

Dal, N. E., & Şahin, Ö. (2018). Elektronik ticarette güven oluşturan faktörlerin satınalma niyeti ile ilişkisi: Trendyol alışveriş sitesi müşterileri ile bir araştırma. *Avrasya Sosyal ve Ekonomik Araştırmalar Dergisi*, *5*(12), 240–259.

Davidson, E., & Vaast, E. (2010). Digital entrepreneurship and its sociomaterial enactment. *In Proceedings of the 43rd Hawaii International Conference on System Sciences*. IEEE Computer Society.

Delacroix, E., Parguel, B., & Benoit-Moreau, F. (2019). Digital subsistence entrepreneurs on Facebook. *Technological Forecasting & Social Change, 146*, 887–899. . techfore.2018.06.018 doi:10.1016/j

Di Zhang, D., & Bruning, E. (2011). Personal characteristics and strategic orientation: Entrepreneurs in canadian manufacturing companies. *International Journal of Entrepreneurial Behaviour & Research*, *17*(19), 82–103. doi:10.1108/13552551111107525

Du, W. D., Pan, S. L., Zhou, N., & Ouyang, T. (2018). From a marketplace of electronics to a digital entrepreneurial ecosystem (DEE): The emergence of a meta-organization İn Zhongguancun, China. *Information Systems Journal*, *28*(6), 1158–1175. doi:10.1111/isj.12176

Durukan, T. (2007). Dünden bugüne girişimcilik ve 21.yüzyılda girişimciliğin önemi. *Journal of Entrepreneurship and Development*, *1*(2), 25–38.

Eleftheriadou, D. (2014), Digital entrepreneurship the EU vision, strategy and actions. *First Meeting of the Member States Board on Digital Entrepreneurship*, 1-13.

Global Entrepreneurship Index (GEI). (2017). *The Global entrepreneurship and development index*. https://thegedi.org/global-entrepreneurship-and-development-index/

Hasker, K., & Sickles, R. (2010). EBay in the economic literature: Analysis of an auction marketplace. *Review of Industrial Organization*, *37*(1), 3–42. doi:10.100711151-010-9257-5

Helms, M. M., Rodríguez, M. A., Ríos, L., & Hargrave, W. B. (2011). Entrepreneurial potential in Argentina: A swot analysis. *Competitiveness Review*, *21*(3), 269–287. doi:10.1108/10595421111134859

Henama, U. S. (2018). Disruptive entrepreneurship using Airbnb: The South African experience. *African Journal of Hospitality, Tourism and Leisure*, *7*(1), 1–16.

Hisrich, R. (2007). Entrepreneurship research and practice. *A Call to Action for Psychology, 62*(6), 575-589.

Hull, C. E., Hung, Y. C., Hair, N., Perottı, V., & De Martino, R. (2007). Taking advantage of digital opportunities: A typology of digital entrepreneurship. *International Journal of Networking and Virtual Organisations*, *4*(3), 290–303. doi:10.1504/IJNVO.2007.015166

Kamalian, A. R., Yaghoubi, N., & Moloudi, J. (2016). Providing functional model for developing digital entrepreneurship. *International Journal of Business and Development Studies*, *8*(1), 97–116.

Kleín, M. (2020). Digital transformation scenarios of businesses - a conceptual model proposal. *Electronic Journal of Social Sciences*, *19*(74), 997–1019. doi:10.17755/esosder.676984

Koçak, O. (2009). Bilgi teknolojilerini kullanan yeni girişimcilik modelinin iş yaratma etkisi. *Sosyal Siyaset Konferansları Dergisi*, *0*(57), 382–405.

Koh, H. C. (1996). Testing hypotheses of entrepreneurial characteristics: A study of Hong Kong MBA Students. *Journal of Managerial Psychology*, *11*(3), 12–25. doi:10.1108/02683949610113566

Konak, A. (2019). Küresel ölçekte gerçekleştirilen girişimcilik faaliyetleri sürecinde karşılaşılan sorunların tespiti ve değerlendirilmesi: Türkiye örneği. *Üçüncü Sektör Sosyal Ekonomi Dergisi*, *54*(1), 446-462.

Kotarba, M. (2018). Digital transformation of business models. *Foundations of Management*, *10*(1), 123–142. doi:10.2478/fman-2018-0011

Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., & Spitzer, J. (2018). Digital entrepreneurship: A research agenda on new business models for The Twenty- First Century. *International Journal of Entrepreneurial Behaviour & Research*, *25*(2), 353–375. doi:10.1108/IJEBR-06-2018-0425

Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı (KOSGEB). (2019). *Turkey Entrepreneurial Strategy and Action Plan 2015-2018*. https://www.kosgeb.gov.tr/Content/Upload/Dosya/Mali%20Tablolar/Gisep_2015-2018_EN.pdf

Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, *29*(5), 577–597. doi:10.1111/j.1540-6520.2005.00099.x

Linke, K. (2011). Generatıon Facebook? – The hıstory of socıal networks, *Global Business Management Research Conference*, Fulda, Germany.

Machmud, S., & Sidharta, I. (2014). Business models for smes in Bandung: Swot analysis. *Journal Ekonomi*. *Bisnis and Entrepreneurship*, *8*(1), 51–61.

Macko, A., & Tyszka, T. (2000). Entrepreneurship and risk taking. *Applied Psychology*, *58*(3), 469–487.

Marangoz, M. (2016). *Girişimcilik* [Lexical characteristics of Turkish language]. Beta Yayınevi.

Milliyet. (2019). *Yemeksepeti*. https://www.milliyet.com.tr/pembenar/yemeksepeti-589-milyon-dolara-satildi-2054297

Mishra, M. K. (2010). Why is eBay the most successful online auction? *Global Journal of Management and Business Research*, *10*(9), 62–65.

Montag, C., Becker, B., & Gan, C. (2016). The multipurpose application WeChat: A reviewon recent research. *Frontiers in Psychology*, *9*, 2247. https://doi.org/10.3389/fpsyg.2018.02247

Mutlubiev. (2020). *Mutlubiev About Us*. https://mutlubiev.com

Ngoasong, M. Z. (2015). Digital entrepreneurship in emerging economies: The role of ıcts and local context. *42nd AIB-UKI Conference*.

Norton, W. I., & Moore, W. T. (2006). The influence of entrepreneurial risk assessment on venture launch or growth decisions. *Small Business Economics*, *26*(3), 215–226.

Özbek, A., Esmer, Y., & Şaylan, O. (2018). Model proposal for new product development in Turkish garment sector in the context of e-entrepreneurship. *Iconsr 2018-1th International Conference on Social Science Research*.

Özdener. (2018), *E-perakende hizmet kalitesinin marka değerine etkisi: Trendyol Örneği* [Unpublished master dissertation]. İstanbul Gelişim Üniversitesi, İstanbul, Turkey.

Özeroğlu, A. C. (2018). *Girişimcilik faaliyetlerinde e-ticaret uygulamaları: Inovasyon ve dijital girişimcilik* [Unpublished master dissertation]. İstanbul Gelişim Üniversitesi, İstanbul, Turkey.

Öztaş, Ş. (2009), *E-Ticaret şirketlerinin markalaşma süreci: Amazon.Com ve Yemeksepeti.Com* [Unpublished master dissertation]. Dokuz Eylül Üniversitesi, İzmir, Turkey.

Öztürk, E., & Koç, K. (2017). Endüstri 4.0 ve mobilya endüstrisi. *İleri Teknoloji Bilimleri Dergisi, 6*(3), 786-794.

Öztürk, M. D., & Arslan, İ. K. (2016). *Türkiye'de kadın girişimcilik: Kadınları girişimciliğe yönelten faktörler, karşılaştıkları sorunlar ve çözüm önerileri* [Lexical characteristics of Turkish language]. İstanbul Ticaret Üniversitesi Dış Ticaret Enstitüsü.

Pehlivanoğlu, F., & Kayan, K. (2019). Türkiye'de girişimcilik: Mevcut durum analizi ve çözüm önerileri. *Kırklareli Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *8*(1), 58–78.

Plantin, J.-C., Lagoze, C., Edwards, P. N., & Sandvig, S. (2018). Infrastructure studies meet platform studies in the age of Google and Facebook. *New Media & Society*, *20*(1), 293–310.

Savic, D. (2019). From digitization, through digitalization, to digital transformation information discovery. *Tecnology*. *Strategies (La Jolla, Calif.)*, *43*(1), 36–39.

Şeker, A., Doğan, M., & Elitaş, B. L. (2016). KOBİ'lerde girişimcilik değerleri ve dış ticaret faaliyetleri arasındaki ilişki: Sanayi işletmeleri örneği. *İşletme Araştırmaları Dergisi, 8*(2), 198-223.

Smith, A. N., & Fischer, E., & Yongjian. (2012). How does brand-related user generated content differ across YouTube, Facebook and Twitter? *Journal of Interactive Marketing*, *26*(2), 102–113.

Soylu, A. (2018). Endüstri 4.0 ve girişimcilikte yeni yaklaşımlar. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *0*(32), 43–57.

Sudrajat, J., Rahman, M. A., & Sianturi, A., & Vendy. (2016). Entrepreneurship learning process by using swot analysis. *Journal The Winners*, *17*(1), 67–75.

Tatar, N. (2018). *Kırsal alanda kadınların girişimcilik algıları Konya İli Derbent ilçesi örneği* [Unpublished master dissertation]. *S*elçuk Üniversitesi, Konya, Turkey.

Trendyol. (2019). *Trendyol*. https://www.netmaaslari.com/2016/09/trendyol-maaslari.html, 2019.

Turner, F. (2009). Burning man at Google: A cultural infrastructure for new media production. *New Media & Society*, *11*(1), 73–94.

Turuk, M. (2018). The importance of digital entrepreneurship in economic development. *7th International Scientific Symposium*.

Tyszka, T., Cie'slik, J., Domurat, A., & Macko, A. (2011). Motivation, self-efficacy, and risk attitudes among entrepreneurs during transition to a market economy. *Journal of Socio-Economics*, *40*(2), 124–131.

Ulusoy, G., Özlü, E., Kılıç, K., Altekin, T., Budak, E., Çatay, B., Karaata, S., Pasin, M., & Varandi, S. (2017). *Sanayide dijitalleşme stratejileri çalıştayı* [Lexical characteristics of Turkish language]. İstanbul Ticaret Üniversitesi Dış Ticaret Enstitüsü.

Vineela, G. S. (2018). Digital entrepreneurship. *IJIRMPS*, *6*(4), 441–448.

Wikipedia. (2019). *Trendyol*. https://tr.wikipedia.org/wiki/Trendyol

Wu, S., Matthews, L., & Dagher, G. K. (2007). Need for achievement, business goals, and entrepreneurial persistence. *Management Research News*, *30*(12), 928–941.

Yalçınkaya, M. (2017). Gelişen Türkiye'nin rekabetçi gücü manisa sanayi bölgesi kobi'lerinin sosyo-ekonomik yapısı: Swot analizi. *Manisa Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, *15*(2), 279–308.

Yazdanifard, R., & Li, M. T. H. (2014). The Review of Alibaba's online business marketing strategies which navigate them to present success. *Global Journal of Management and Business Research: E-Marketing*, *14*(7), 32–40.

Yemeksepeti. (2019). *Yemeksepeti About Us*. https://www.yemeksepeti.com/sss

Zhao, F., & Collier, A. (2016). Digital entrepreneurship: research and practice. *9th Annual Conference of the EuroMed Academy of Business*.

ADDITIONAL READING

Hisrich, R. (2007). Entrepreneurship research and practice. *A Call to Action for Psychology, 62*(6), 575-589.

Hull, C. E., Hung, Y. C., Hair, N., Perottı, V., & De Martino, R. (2007). Taking advantage of digital opportunities: A typology of digital entrepreneurship. *International Journal of Networking and Virtual Organisations*, *4*(3), 290–303. doi:10.1504/IJNVO.2007.015166

Kamalian, A. R., Yaghoubi, N., & Moloudi, J. (2016). Providing functional model for developing digital entrepreneurship. *International Journal of Business and Development Studies*, *8*(1), 97–116.

Klei̇n, M. (2020). Digital transformation scenarios of businesses - a conceptual model proposal. *Electronic Journal of Social Sciences*, *19*(74), 997–1019. doi:10.17755/esosder.676984

Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., & Spitzer, J. (2018). Digital entrepreneurship: A research agenda on new business models for The Twenty- First Century. *International Journal of Entrepreneurial Behaviour & Research*, *25*(2), 353–375. doi:10.1108/IJEBR-06-2018-0425

Savic, D. (2019). From digitization, through digitalization, to digital transformation information discovery. *Tecnology*. *Strategies (La Jolla, Calif.)*, *43*(1), 36–39.

Ulusoy, G., Özlü, E., Kılıç, K., Altekin, T., Budak, E., Çatay, B., Karaata, S., Pasin, M., & Varandi, S. (2017). *Sanayide dijitalleşme stratejileri çalıştayı* [Lexical characteristics of Turkish language]. İstanbul Ticaret Üniversitesi Dış Ticaret Enstitüsü.

Vineela, G. S. (2018). Digital entrepreneurship. *IJIRMPS*, *6*(4), 441–448.

KEY TERMS AND DEFINITIONS

Digital Enterprises: Digital enterprises are businesses that are established on a digital platform and sell via digital platform.

Digital Entrepreneurs: Digital entrepreneurs are people producing by using digital technologies on the digital platforms.

Digital Entrepreneurship: Digital entrepreneurship is producing products or services by using digital technologies.

Digitalization: Digitalization is the execution of business processes on digital platforms.

Entrepreneur: An entrepreneur is a person who gathers production factors with the aim of producing products or services and who ventures profit/loss.

Entrepreneurship: Entrepreneurship is exploring new job opportunities, gathering production factors which are necessary for production.

SWOT Analysis: SWOT analysis is a strategic plan that shows the strengths and weaknesses of the business and the opportunities and threats it will face.

Chapter 9
Exploring the Role of Local Financial Markets in the Portfolio Investment-Growth Nexus:
Insights From Selected Countries in Sub-Saharan Africa

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ABSTRACT

In recent times, foreign portfolio investment inflows have been considered pivotal to sub-Saharan Africa's growth (SSA) as they help enhance liquidity and make a substantial fund available for investment. However, some scholars have stressed that the sustainable inflows of portfolio investments and their impact on growth depend on the extent to which the recipient country can develop its local financial markets. As a result, this chapter aims to determine the moderating role of local financial markets in facilitating the effects of portfolio investments on economic growth in 28 SSA between the period 1995-2018. The study employed the system generalized method of moments (SGMM) and found that portfolio investments positively and significantly impact economic growth. However, the study observes that the interaction between portfolio investments and financial market development is negative and significant, presupposing that the relationship between portfolio investment and economic growth is not contingent on local financial markets.

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INTRODUCTION

Globalization has no doubt resulted in structural change in the global economy; thus, bringing about changes in the political, economic, cultural, and spiritual development strategies; and create a continuous interdependence of the world (Rode & de Viteri, 2018; Van Neuss, 2018). The growing interdependence due to globalization has, however, caused countries to pay more attention to developing competitive advantages in cross-border trade, investments, and income flow in relation to GDP (Glushkova, Lomakina & Sakulyeva, 2019).

Contemporary studies on globalization focus more on the economic aspect of globalization (such as the foreign direct investment and foreign portfolio investment) and analyze the indicators that most closely reflect the development of countries in the globalizing world economy. It is assumed that foreign direct investment has a significant impact on the development of an economy because is often considered as the main source of capital inflows (Sarkodie & Strezov, 2019). However, this is no longer the case as foreign portfolio investments are increasingly replacing foreign direct investments as a source of capital inflow in many developing countries (Shabbir & Muhammad, 2019). The surge in foreign portfolio investments in the developing nations, according to Shabbir and Muhammad (2019), is due to the liberalization of these nations, high returns on investment, trade openness, and improved communication and technology globally. Foreign portfolio investments are cross-border investments, which involve the purchase of securities such as bonds, notes, money market instruments, and financial derivatives in a bid to make a profit (Baghebo & Apere, 2014).

Foreign portfolio investments are beneficial to developing and emerging countries, as they help to fill the saving-investment gaps, finance innovation, and increase capital productivity by insuring against liquidity risk (Bayar & Sasmaz, 2019; Debbiche, 2020). Despite the benefits of portfolio investment inflows to a host economy, they can, however, have an adverse effect on the economy due to its volatile nature. For instance, it is argued that portfolio investment volatility majorly accounted for the financial market distress, which resulted in the financial crisis of 1997-1998 (Duasa & Kassim, 2009). The volatile nature of portfolio investment inflows makes the execution of macroeconomic stabilization policies difficult.

Existing empirical literature on the growth effect of portfolio investment inflows remains inconclusive. While some empirical studies reported a positive impact of portfolio investments on economic growth (e.g., Ezeanyeji & Maureen, 2019; Albulescu, 2015; Ehigiamusoe & Lean, 2019), others found a negative or no significant relationship (e.g., Anetor, 2020a; Sawalha, Elian & Suliman, 2016; Kuzucu, 2018). Despite the debate on the growth effect of portfolio investments, some scholars are of the notion that there must be a developed financial market before portfolio investment inflows could exert a significant impact on growth (e.g., Adeniyi, Ajide & Salisu, 2015; Mlachila et al., 2016). Unfortunately, existing studies on globalization and cross-border investments pay less attention to investigate whether the impact of foreign portfolio investments on economic growth is contingent on the development of financial institutions of the recipient country.

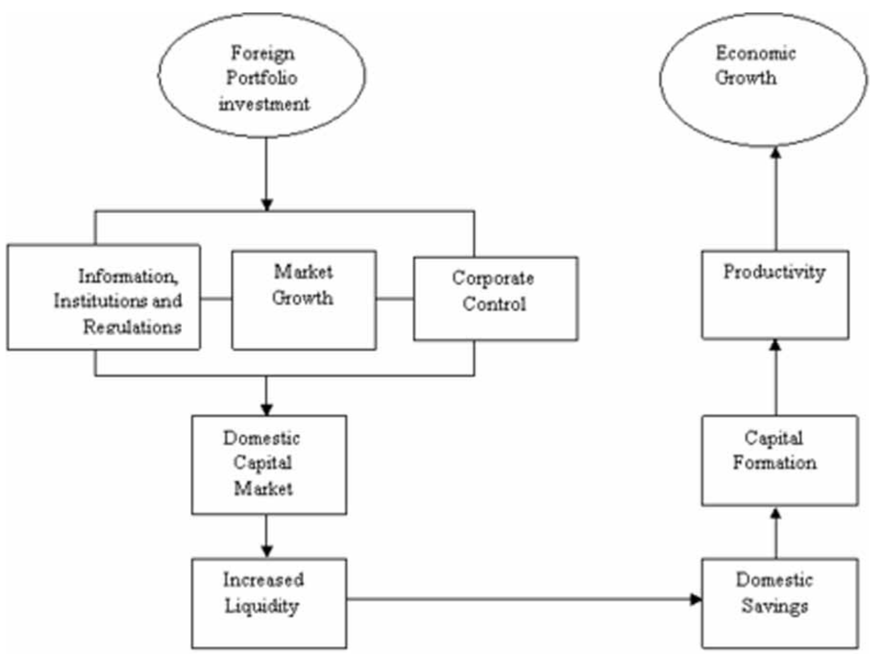
To this end, this study aims to proffer answers to the following cogent research questions: what is the economic growth effect of portfolio investments in sub-Saharan Africa (SSA)? To what extent does the interaction between portfolio investments and financial market development influence economic growth in SSA? In other words, is the relationship between portfolio investments and economic growth contingent on financial market development in SSA? This study center on SSA because the frontier markets economies of the region have received an increasing volume of portfolio capital inflows in the last decade (Anetor, 2020b; Gueye et al., 2014; Korkpoe & Howard, 2019).

The remaining parts of the study are structured as follows: The second section conceptualizes the role of portfolio investment in an economy. Section 3 reviews existing studies that investigated the relationship between portfolio investments and economic growth. It also examines extant studies on the role of local financial markets in the portfolio investment-growth nexus. Section 4 presents the methodology employed as well as the sources of data used. Section 5 presents and discusses the regression results. The last part of the study is the conclusion and policy implications.

CONCEPTUALIZING THE ROLE OF PORTFOLIO INVESTMENT IN ECONOMY PERFORMANCE

Figure 1 shows how foreign portfolio investment can affect economic growth through domestic financial markets.

Figure 1.



First, portfolio investment affects the economy through the domestic capital market. It contributes to the development of local capital markets through three major ways: First, foreign investors would insist on timely and quality information, protection of the minority, and efficient trading regulations. This would, therefore, necessitate the evolvement of new institutions and services. Second, the active anticipation of foreign investors would reinforce the level of confidence among local investors, thus increasing the rate of overall market participation. Third, since the state of the market for corporate control in the developing countries is still in its infancy, foreign portfolio investment can play a disciplinary role in the market by inculcating the concepts of shareholders' values in the local mindset.

A developed capital market would offer existing and potential investors with a range of assets with a diverse degree of risk, return, and liquidity. The increased choice of assets, as well as the existence of a vibrant capital market, would offer savers with more liquidity and options, thereby inducing more savings. This, in turn, would increase the rate of domestic savings and enhance the level of capital formation. The capital formation would increase the level of productivity, and a high level of productivity would translate into the growth of the economy.

REVIEW OF LITERATURE

The role of portfolio investment inflows on the economic growth of developing countries has widely been discussed in the literature. However, empirical findings on the relationship between portfolio investments and economic growth are still controversial and ambiguous. Several empirical studies concluded that portfolio investments drive economic growth (Ahmad, Draz & Yang, 2016; Alley, 2015; Anetor, 2019; Fukuda, 2019; Winona & Nuzula, 2016). However, other studies observed a negative or no relationship between portfolio investments and growth (Ahmad, Yang & Draz, 2015; Alley & Poloamina, 2015, Anetor, 2020c; Aizenman, Jinjarak & Park, 2013). Scholars have also stressed that the growth impact of portfolio investment flows to developing countries depend on the domestic financial market (Agbloyor et al., 2014; Baharumshah, Slesman & Devadason, 2017; Choong et al., 2010; Durham, 2004; Slesman, Baharumshah, & Wohar, 2015).

Alley (2015) employed the two-stage least square (2SLS) and system GMM to investigate the effect of shocks in portfolio investment on the economic growth of 14 countries in the Sub-Saharan region over the period 1990-2013. The study found that portfolio investments have a positive and significant impact on long-term growth. In the same vein, Ahmad, Draz, and Yang (2016) studied the growth effect of foreign portfolio investment of the Association of Southeast Asian Nations (ASEAN) over the period 2001 and 2013. The study used Granger causality and M Wald test and found that foreign portfolio investment exerts a positive and significant impact on the economic growth of ASEAN, except for Singapore. Anetor (2019) used quarterly data between the period 1986Q1–2016Q4 to examine the effect of portfolio investment inflows on economic growth in the Nigerian economy. Applying the structural vector autoregressive (SVAR) model, the study found that portfolio investments result in economic growth.

Using data from Indonesia Stock Exchange and Bank of Indonesia, Winona and Nuzula (2016), studied the relationship between foreign portfolio investment and economic growth over the period 2006-2014. Employing path analysis as the research technique, the study found that foreign portfolio investments have a positive and significant impact on economic growth. Fukuda (2019) studied finance-growth nexus with trade openness, FDI and portfolio investments in the Mexican economy over the period 1970-2016. The study employed the cointegration and Granger causality tests in the framework of the VECM and found that financial development, proxy with financial size and efficiency have a negative impact on economic growth.

However, Agbloyor et al. (2014) concluded that portfolio investment has a negative impact on economic growth when they studied the role of domestic market in the link between private capital inflows and economic growth using instrumental variable generalized method of moments (IV-GMM) in 14 African countries. The study, however, found that countries with a developed financial market were able to transform the negative effect of portfolio investments to a positive one. This presupposes that portfolio investments can only culminate into growth in the presence of a strong financial market.

Using the Granger causality test, Ahmad, Yang, and Draz (2015) examined the link between portfolio inflows and economic growth in the Chinese and Indian economies between 2001 and 2013 and found that there is no existence of a relationship between foreign portfolio investments and economic growth. Employing the structural vector autoregressive (SVAR) technique of estimation, Alley and Poloamina (2015) investigated the effects of the various types of capital inflows, including portfolio investments in 14 countries in SSA over the period 1980-2012. They found that shocks to portfolio investments, among others, have an adverse effect on economic growth. Anetor (2020c) used the structural vector autoregressive (SVAR) technique to examine the link between private capital inflows, including portfolio investments, financial development and growth in the Nigerian economy over the period 1986-2016. The study found that portfolio investments, among others, have no significant impact on economic growth. Aizenman, Jinjarak and Park (2013) examined the relationship between the various components of capital flows and economic growth before and after the global crises in 100 countries over the period 1990 to 2010. The study observed that foreign portfolio investment has no significant impact on economic growth.

Some studies argue that the economic growth effect of portfolio investments depend on the existence of a developed financial market. For example, Baharumshah, Slesman, and Devadason (2017) investigated the growth effects of the various components of capital inflows. They concluded that the impact of portfolio investments on growth is dependent on the level of financial market development of the domestic economy. This suggests that a country stands to gain from portfolio investment when the country's level of financial market development has exceeded a certain threshold. Choong et al. (2010) analyzed the role of the stock market in the relationship between private capital flows and growth in 32 developing and 19 developed economies between 1988 and 2002 using the generalized method of moments (GMM). The study found, among others, that portfolio investments have a negative effect on economic growth in both the developing and the developing countries. The study, however, showed that the interaction between private capital inflows (including portfolio investment) with the stock market exerts a positive and significant impact on economic growth. The finding presupposes that the existence of a developed stock market for portfolio investments exert an impact on economic growth. Durham (2004) studied the economic growth effect of private capital inflows in 80 countries between 1978 and 1998 and found that portfolio investments have no direct impact on economic growth. The study also observed that the effect of portfolio investment on growth is contingent on the extent of financial development.

Slesman, Baharumshah, and Wohar (2015) examined the role of institutions in the relationship between capital inflows and economic growth in 80 countries, which comprises developing, emerging, and advanced economies between 1975 and 2005. Using threshold regression, the study found that portfolio investments exert a positive and significant impact on economic growth in countries with high-quality institutions. However, the study also found that the economic growth effect of portfolio investment was negative and statistically insignificant in countries where the quality of an institution falls below a certain threshold.

It can be drawn from the preceding literature that the impact of portfolio investments on economic growth is not unconnected with a developed financial market. In other words, the absence of a developed financial market appears to limit the inflows and potential positive spillover effect of portfolio investments. The shortcoming of the existing studies is that, while overwhelming literature focused on the impact of portfolio investments on growth, fewer studies probe into the economic growth effect of the interaction between portfolio investments and financial market development in SSA. The current study, therefore, contributes to the existing literature by exploring whether or not a complementarity relationship exists between portfolio investments and financial market development.

METHODOLOGY

Model Specification

The study specified two models, and each of the models aims at addressing each of the research questions raised in the introduction section. Eq. (1) addresses the first research question, which aim to examine the impact of portfolio investment on economic growth in SSA. Eq. (2) specifies the growth effect of the interaction of portfolio investments and financial development.

$$\begin{aligned} \mathrm{GDPPCG}_{it} &= {}^{2}{}_{0} + {}^{2}{}_{1}\mathrm{GDPPCG}_{it-1} + {}^{2}{}_{2}\mathrm{PFI}_{it} + {}^{2}{}_{3}\mathrm{GCF}_{it} + {}^{2}{}_{4}\mathrm{SENR}_{it} \\ &+ {}^{2}{}_{5}\mathrm{TOP}_{it} + {}^{2}{}_{6}\mathrm{POP}_{it} + {}^{2}{}_{72OPR}\mathrm{GXP}_{it} + {}^{2}{}_{82OPR}\mathrm{INF}_{it} + {}^{2}{}_{92OPR}\mathrm{XDEBT}_{it} + ¼_{it} \end{aligned} \tag{1}$$

Where: GDPPCG is GDP per capita growth and it is used to proxy economic growth. The independent variable is portfolio investment (PFI) while other variables in the model are referred to as control variables and these include GCF is gross capital formation as a percentage of GDP, SENR is secondary school enrolment as a percentage of gross enrollment; and it is used to proxy the literacy rate of a country. TOP is trade openness and it refers to the degree to which an economy trade with other nations of the world. POP is population growth rate, GXP is government expenditure as a percentage of GDP, INF is inflation, XDEBT is external debt as a percentage of GDP, i connotes country, t represents year and μ is the error term.

$$\begin{aligned} \mathrm{GDPPCG}_{it} &= \pm_{0} + \pm_{1}\mathrm{GDPPCG}_{it-1} + \pm_{2}\mathrm{PFI}_{it} + \pm_{3}(\mathrm{PFI}_{it}{*}\mathrm{FD}_{it}) + \pm_{4}\mathrm{FD}_{it} + \pm_{5}\mathrm{GCF}_{it} \\ &+ \pm_{6}\mathrm{SENR}_{it} + \pm_{7}\mathrm{TOP}_{it} + \pm_{8}\mathrm{POP}_{it} + \pm_{92OPR}\mathrm{GXP}_{it} + \alpha_{10}\mathrm{INF}_{it} + \alpha_{11}\mathrm{XDEBT}_{it} + ¼_{it} \end{aligned} \tag{2}$$

Where: GDPPCG is the dependent variable, which represents GDP per capita growth, PFI is portfolio investment, FD represents financial market development and it is proxy by three indicators namely: broad money as a percentage of GDP (M_2GDP), domestic credit to private sector as a percentage of GDP (CREPS) and banking sector credit as a percentage of GDP (BSCRE). M_2GDP is the sum of currency outside banks and demand deposits other than those of the Central government. CREPS refers to financial resources provided to the private sector by monetary authorities and deposit money banks. BSCRE refers to financial resources provided by depository corporations other than the Central bank. $PFI_{it}*FD_{it}$ represents the interaction of portfolio investment with financial market development.

Data and Analytical Technique

The study used data on 28 SSA countries between the periods 1995-2018. These countries include Benin, Botswana, Burkina Faso, Cameroon, Congo Republic, Cote d'Ivoire, Gabon, Guinea, Guinea Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, Tanzania, Togo, Uganda, Zambia, and Zimbabwe. The countries are selected based on the availability of data. The various data employed for the study as well as their sources are majorly obtained from the World Development Indicator (WDI), 2019 (see Table 1).

The study applied the System Generalized Method of Moments (SGMM) developed by Arrellano and Bond (1991) as well as the dynamic panel regression. The rationale for using SGMM is because it is very efficient when dealing with panel data that have less time periods and more cross sections. Also, SGMM takes care of endogeneity problem and it is useful in eliminating the problem of heteroskedasticity and serial correlation.

Table 1. Data Sources and Measurement of Variables

Variables	Description	Measurement	Expectation	Source
GDPPCG	Economic Growth	It is measured as GDP per capita growth.		World Development Indicator (WDI), 2019
PFI	Portfolio Investment	It is measured as the percentage ratio of portfolio equity inflows (the purchase of stock by foreign investors) to GDP.	Positive	WDI, 2019
M_2GDP, CREPS, BSCRE	Financial Market Development	The study used three measures to capture financial sector development: M_2 to GDP; domestic credit to private sector (% GDP); domestic credit to private sector by banks (% of GDP).	Positive	WDI, 2019
GCF	Gross capital formation	It will be measured as the ratio of gross capital formation divided by GDP.	Positive	WDI, 2019
SENR	Secondary school enrollment (% gross).	This is used to proxy human capital development.	Positive	WDI, 2019
TOP	Trade Openness	It is computed as the percentage ratio of sum of exports plus imports of goods to total output.	Positive	WDI, 2019
POP	Population growth	It is computed as the annual growth rate.	Negative	WDI, 2019
GXP	Government consumption expenditure (% GDP)	It consist of total expenses and the net acquisition of non-financial assets.	Positive	WDI, 2019
INF	Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services.	Negative	WDI, 2019
XDEBT	External debt (% of GDP)	It comprises of debt, liabilities in the form SDRs, currency and deposit, debt securities, loans, insurance, and pension.	Positive/Negative	WDI, 2019

Source: Authors' Compilation (2020)

RESULTS AND DISCUSSION

Table 2 reports the regression estimates of the impact of portfolio investment on economic growth using system GMM.

The results show that portfolio investments positively and significantly contributed to economic growth of SSA countries. The result lends credence to existing studies (e.g., Ahmad, Draz & Yang, 2016; Alley, 2015; Anetor, 2019; Fukuda, 2019; Winona & Nuzula, 2016), which found that portfolio investments have a positive and significant impact on economic growth. The study also found that domestic investments, proxy by gross capital formation, exerts a positive and significant influence on economic performance of SSA. This is in consonance with economic postulation that perceive that investments have a multiplier effect on the growth of an economy. Furthermore, the study found that inflation has a negative and significant effect on economic growth. The economic rationale is that inflation generally increase the cost of production and cause effective aggregate demand to fall; thus, resulting in decline in GDP. External debt exhibits a negative and significant influence on economic growth. This is consistent with existing findings that concluded that external debt has adverse effect on economic growth (Ayadi & Ayadi, 2008; Ada, Agu & Umunna, 2016; Kharusi & Ada, 2018). A possible explanation for this result is that a substantial amount of foreign debt obtained from both the Paris Club of Creditors and London of Creditors are not used wisely and prudently.

Table 2. Impact of Portfolio Investment on Economic Growth

Dependent Variable: GDP per capita growth	**Estimates**
GDP per capita growth (-1)	0.272 (0.217)
Portfolio investments (% of GDP)	0.009*** (0.003)
Gross capital formation (% of GDP)	0.078** (0.034)
Secondary school enrolment (% of Gross enrolment)	0.005 (0.012)
Trade openness	-0.002 (0.019)
Population growth	0.146 (0.603)
Inflation	-0.084* (0.046)
External debt (% of GDP)	-0.008** (0.004)
Government consumption expenditure (% of GDP)	0.003 (0.021)
***AR*(1)**	0.008
***AR*(2)**	0.282
Hansen Test	0.378
Diff-in-Hansen (excluding group)	0.350
Diff-in-Hansen (H_0 = exogenous)	0.409
Number of observations	504
Number of countries	28
Number of instruments	24

Source: Authors' computation using data obtained from the WDI (2019)
Note: The standard errors are reported in parentheses; *, significant at 10%; **, significant at 5%; ***, significant at 1%

Finally, the study used three specification tests namely: the Hansen test of the over-identifying restrictions; difference-in-Hansen test for multiple instruments; and the autocorrelation test of disturbances (Arellano & Bond, 1991) to ascertain the validity of the regression estimates. The results of the Hansen test and the difference-in-Hansen test confirm that the instruments used for estimation are valid; therefore, over-identification does not exist. The probability value of *AR* (2) indicates that the null hypothesis of no second-order serial correlation cannot be rejected. As a result, the regression results are free from the problem of serial correlation.

Regression Results on the Impact of the Interaction between Portfolio Investments and Financial Market Development on Economic Growth

Table 3 depicts the regression results of the impact of the interaction between portfolio investments and financial market development on economic growth. It is important to reiterate that financial market development is measured using three variables: Broad money as a % of GDP (M_2GDP), Credit to private sector as % of GDP (CREPS), and Banking sector credit as % of GDP (BSCRE).

As a result, column 1 of Table 3 shows the result of the impact of the interaction between portfolio investment and financial market development (measured by M_2GDP) on growth. Column 2 reports the result of the impact of the interaction between portfolio investment and financial market development (measured by CREPS) on economic growth. Column 3 presents the result of the impact of the interaction between portfolio investment and financial market development (measured by BSCRE) on economic growth.

The regression results in Column 1, 2 and 3, consistently show that portfolio investments exert a positive and significant impact on economic growth. This again support the existing studies that concluded that portfolio investments are driver of economic growth (Ahmad, Draz & Yang, 2016; Alley, 2015; Anetor, 2019; Fukuda, 2019; Winona & Nuzula, 2016). However, the study observed that, though the interaction between portfolio investment and financial market development is significant, but it is negative. This presupposes that financial markets in SSA does not complement portfolio investments; rather it is substitutes. In other words, the impact of portfolio investments on economic growth in SSA is not contingent on the development of local financial market. The result is, therefore, contrary to extant studies (e.g., Agbloyor et al., 2014; Baharumshah et al., 2017; Choong et al., 2010; Durham, 2004), which noted that a robust financial market is a condition for portfolio investments to impact economic growth positively.

The study also concluded that financial markets development negatively and significantly affects economic growth in SSA. This is contrary to economic expectation but lend credence to existing studies, which confirmed the existence of a negative relationship between financial development and economic growth (e.g., Anetor, 2020b; Ductor & Grechyna, 2015). Gross capital formation, which proxy domestic investments, has consistently shown that it positively and significantly influences economic growth. The study, however, shows that inflation has a negative and significant effect on growth. In the same vein, the study concluded that external debt did not contribute to economic growth; rather, its effect is negative and significant. Finally, the Hansen test and the difference-in-Hansen test confirm the validity of the instruments employed while *AR* (2) reveals that the regression estimates is devoid of the problem of serial correlation.

Table 3. Impact of the Interaction between Portfolio Investment and Financial Market Development on Growth

Dependent Variable: GDP per capita growth	[1]	[2]	[3]
GDP per capita growth (-1)	0.236 (0.210)	0.225 (0.199)	0.233 (0.197)
Portfolio investment as % of GDP (PFI)	0.015*** (0.004)	0.012*** (0.003)	0.012*** (0.002)
PFI*M_2GDP	-0.0002** (0.0001)	-	-
Broad money as a % of GDP (M_2GDP)	-0.057*** (0.014)	-	-
PFI*CREPS	-	-0.0002** (0.0001)	-
Credit to private sector as % of GDP (CREPS)	-	-0.091*** (0.029)	-
PFI*BSCRE	-	-	-0.0001** (0.0001)
Banking sector credit as % of GDP (BSCRE)	-	-	-0.089** (0.038)
Gross capital formation (% of GDP)	0.085** (0.033)	0.094** (0.034)	0.093** (0.035)
Secondary school enrolment (% of gross enrolment)	0.012 (0.012)	0.018 (0.012)	0.018 (0.011)
Trade openness	-0.0007 (0.019)	-0.0002 (0.019)	-0.0004 (0.019)
Population growth	0.089 (0.607)	0.065 (0.575)	0.044 (0.576)
Inflation	-0.087* (0.049)	-0.088* (0.046)	-0.089* (0.046)
External debt (% of GDP)	-0.013*** (0.004)	-0.012*** (0.004)	-0.012*** (0.004)
Government consumption expenditure (% of GDP)	0.026 (0.016)	0.016 (0.023)	0.015 (0.023)
AR(1)	0.010	0.009	0.008
AR(2)	0.370	0.379	0.354
Hansen Test	0.589	0.459	0.481
Diff-in-Hansen (excluding group)	0.271	0.284	0.266
Diff-in-Hansen (H_0 = exogenous)	0.744	0.564	0.613
Number of observations	504	504	504
Number of countries	28	28	28
Number of instruments	26	26	26

Source: Authors' computation using data obtained from the WDI (2019)

Note: The standard errors are reported in parentheses; *, significant at 10%; **, significant at 5%; ***, significant at 1%

CONCLUSION AND POLICY IMPLICATIONS

This study investigated the moderating role of local financial markets in enhancing the effects of portfolio investments on economic growth in 28 countries in Sub-Saharan Africa between the period 1995-2018. Using the system generalized method of moments, the study found that portfolio investments contributed to economic growth in SSA. The study, however, found that the interaction between portfolio investments and financial market development is negative and significant presupposing that the relationship between portfolio investments and economic growth is not contingent on local financial markets. In other words, local financial markets did not complement portfolio investments in facilitating economic growth in Sub-Saharan Africa.

The implication of this study is that the financial markets of Sub-Saharan Africa is weak and underdeveloped; hence, policymakers in sub-Saharan Africa countries should endeavor to develop their local financial markets to positively intermediate portfolio investment inflows to stimulate economic growth.

REFERENCES

Ada, M. S., Agu, O., & Umunna, G. (2016). Impact of external debt on economic growth in Nigeria: An ARDL bound testing approach. *Journal of Economics and Sustainable Development*, *7*(10), 16–26.

Adeniyi, O., Ajide, B., & Salisu, A. (2015). Capital flows, financial development and growth in sub-Saharan Africa. *Journal of Economic Development*, *40*(3), 85–103. doi:10.35866/caujed.2015.40.3.004

Agbloyor, E. K., Abor, J. Y., Adjasi, C. K. D., & Yawson, A. (2014). Private capital flows and economic growth in Africa: The role of domestic financial markets. *Journal of International Financial Markets, Institutions and Money*, *30*, 137–152. doi:10.1016/j.intfin.2014.02.003

Ahmad, F., Draz, M. U., & Yang, S. C. (2016). Foreign portfolio inflows and economic growth: Evidence from ASEAN5. *Actual Problems of Economics*, *179*(5), 57–69.

Ahmad, F., Yang, S. C., & Draz, M. U. (2015). Causality between foreign portfolio inflows and economic growth: Evidence from China and India. *International Journal of Economics and Finance*, *7*(10), 163–172. doi:10.5539/ijef.v7n10p163

Aizenman, J., Jinjarak, Y., & Park, D. (2013). Capital flows and economic growth in the era of financial integration and crisis, 1990–2010. *Open Economies Review*, *24*(3), 371–396. doi:10.100711079-012-9247-3

Albulescu, C. T. (2015). Do foreign direct and portfolio investments affect long-term economic growth in Central and Eastern Europe? *Procedia Economics and Finance*, *23*, 507–512. doi:10.1016/S2212-5671(15)00539-0

Alley, I. (2015). Private Capital Flows and Economic Growth of Sub-Saharan African Countries. *African Development Review*, *27*(4), 469–483. doi:10.1111/1467-8268.12162

Alley, I., & Poloamina, I. (2015). Private capital flow shocks and sub-Saharan African macroeconomic performance. *Journal of International Economic Studies*, *29*, 61–84.

Anetor, F. O. (2019). Economic growth effect of private capital inflows: A structural VAR approach for Nigeria. *Journal of Economic Development*, *21*(1), 18–21.

Anetor, F. O. (2020a). Financial development threshold, private capital inflows and economic growth. *International Journal of Development Issues*, *19*(1), 77–92. doi:10.1108/IJDI-06-2019-0099

Anetor, F. O. (2020b). Human capital threshold, foreign direct investment and economic growth: Evidence from sub-Saharan Africa. *International Journal of Development Issues*, *19*(3), 323–337. doi:10.1108/IJDI-01-2020-0014

Anetor, F. O. (2020c). Foreign capital inflows, financial development and growth in Nigeria: A structural VAR approach. *Journal of Developing Areas*, *54*(3), 69–86. doi:10.1353/jda.2020.0025

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277–297. doi:10.2307/2297968

Ayadi, F. S., & Ayadi, F. O. (2008). The impact of external debt on economic growth: A comparative study of Nigeria and South Africa. *Journal of Sustainable Development in Africa*, *10*(3), 234–264.

Baghebo, M., & Apere, T. O. (2014). Foreign portfolio investment and economic growth in Nigeria. *International Journal of Business and Social Science*, *5*(11), 108–115.

Baharumshah, A. Z., Slesman, L., & Devadason, E. S. (2017). Types of foreign capital inflows and economic growth: New evidence on role of financial markets. *Journal of International Development*, *29*(6), 768–789. doi:10.1002/jid.3093

Bayar, Y., & Sasmaz, M. U. (2019). Foreign borrowing, foreign direct investment inflows and economic growth in European Union transition economies. *Eastern Journal of European Studies*, *10*(2), 107–125.

Choong, C. K., Baharumshah, A. Z., Yusop, Z., & Habibullah, M. S. (2010). Private capital flows, stock market and economic growth in developed and developing countries: A comparative analysis. *Japan and the World Economy*, *22*(2), 107–117. doi:10.1016/j.japwor.2009.07.001

Debbiche, I. (2020). Foreign Capital Inflows and Economic Growth in GCC Countries. *International Journal of Economics and Financial Issues*, *10*(5), 203–210. doi:10.32479/ijefi.10319

Duasa, J., & Kassim, S. H. (2009). Foreign portfolio investment and economic growth in Malaysia. *Pakistan Development Review*, *48*(2), 109–123. doi:10.30541/v48i2pp.109-123

Ductor, L., & Grechyna, D. (2015). Financial development, real sector, and economic growth. *International Review of Economics & Finance*, *37*, 393–405. doi:10.1016/j.iref.2015.01.001

Durham, J. B. (2004). Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. *European Economic Review*, *48*(2), 285–306. doi:10.1016/S0014-2921(02)00264-7

Ehigiamusoe, K. U., & Lean, H. H. (2019). Foreign capital inflows and economic growth in Nigeria: Any nexus? *Journal of African Business*, *20*(4), 455–471. doi:10.1080/15228916.2019.1581010

Errunza, V. (2001). Foreign portfolio equity investments, financial liberalization, and economic development. *Review of International Economics*, *9*(4), 703–726. doi:10.1111/1467-9396.00308

Ezeanyeji, C. I., & Maureen, I. (2019). Foreign Portfolio Investment on Economic Growth of Nigeria: An Impact Analysis. *International Journal of Academic Management Science Research*, *3*(3), 24–36.

Fukuda, T. (2019). Mexico's finance-growth nexus with trade openness, FDI and portfolio investment: evidence from VECM cointegration analysis. *Ecos de Economía: A Latin American*. *Journal of Applied Econometrics*, *23*(49), 29–44.

Glushkova, S., Lomakina, O., & Sakulyeva, T. (2019). The economy of developing countries in the context of globalization: Global supply chain management. *International Journal of Supply Chain Management*, *8*(1), 876–884.

Gueye, C. A., del Granado, M. J. A., Garcia-Verdu, M. R., Hussain, M. M., Jang, M. B., Weber, M. S., & Corrales, M. J. S. (2014). *Managing volatile capital flows: Experiences and lessons for sub-Saharan African frontier markets*. International Monetary Fund.

Kharusi, S. A., & Ada, M. S. (2018). External debt and economic growth: The case of emerging economy. *Journal of Economic Integration*, *33*(1), 1141–1157. doi:10.11130/jei.2018.33.1.1141

Korkpoe, C. H., & Howard, N. (2019). Volatility Model Choice for Sub-Saharan Frontier Equity Markets-A Markov Regime Switching Bayesian Approach. *EMAJ: Emerging Markets Journal*, *9*(1), 69–79. doi:10.5195/emaj.2019.172

Kuzucu, S. (2018). Do foreign direct investment and portfolio investment stimulate economic growth? Evidence from developing countries. *Journal of Economics Finance and Accounting*, *5*(4), 331–338. doi:10.17261/Pressacademia.2018.1000

Mlachila, M., Cui, L., Jidoud, A., Newiak, M., Radzewicz-Bak, B., Takebe, M., & Zhang, J. (2016). *Financial development in Sub-Saharan Africa: promoting inclusive and sustainable growth (No. 16/11)*. International Monetary Fund.

Rode, M., & de Viteri, A. S. (2018). Expressive attitudes to compensation: The case of globalization. *European Journal of Political Economy*, *54*, 42–55. doi:10.1016/j.ejpoleco.2018.05.007

Sarkodie, S. A., & Strezov, V. (2019). Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries. *The Science of the Total Environment*, *646*, 862–871. doi:10.1016/j.scitotenv.2018.07.365 PMID:30064112

Sawalha, N. N., Elian, M. I., & Suliman, A. H. (2016). Foreign capital inflows and economic growth in developed and emerging economies: A comparative analysis. *Journal of Developing Areas*, *50*(1), 237–256. doi:10.1353/jda.2016.0022

Shabbir, M. S., & Muhammad, I. (2019). The dynamic impact of foreign portfolio investment on stock prices in Pakistan. *Transnational Corporations Review*, *11*(2), 166–178. doi:10.1080/19186444.2019.1616508

Slesman, L., Baharumshah, A. Z., & Wohar, M. E. (2015). Capital inflows and economic growth: Does the role of institutions matter? *International Journal of Finance & Economics*, *20*(3), 253–275. doi:10.1002/ijfe.1514

Van Neuss, L. (2018). Globalization and deindustrialization in advanced countries. *Structural Change and Economic Dynamics*, *45*, 49–63. doi:10.1016/j.strueco.2018.02.002

Winona, A. A., & Nuzula, N. F. (2016). The relationship between foreign portfolio investment and foreign direct investment on economic growth (study at Indonesia Stock Exchange and Bank of Indonesia Period 2006-2014). *Jurnal Administrasi Bisnis*, *39*(2), 44–49.

Chapter 10
Are Foreign Subsidiaries Cooperating for Innovation With Local Partners?
Evidence From the Spanish ICT Sector

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ABSTRACT

In this chapter, a sample of firms active in the Spanish information and communication technology sector during 2003-2014 is analyzed to assess whether foreign subsidiaries are more prone than domestic firms to cooperate for innovation with local partners and ascertain which type of partners they prefer. Results of an econometric model show that foreign subsidiaries are more likely than unaffiliated domestic firms to cooperate for innovation with local partners but not more likely than domestic business groups, even when the size of the firm, the obstacles it faces to innovate, and other factors that may influence cooperation are all controlled. Statistical tests show that foreign subsidiaries prefer partnerships across the value chain. This preference is compared to that of domestic companies.

INTRODUCTION

Worldwide competition has increased both between multinational enterprises (MNEs), and between foreign MNEs and large domestic groups and native MNEs that have appeared even in Southern European countries and in emerging economies. In this panorama of increased competition, the ability to launch new products into the market and to implement new industrial processes constitutes a major advantage. However, the alleged technological superiority of MNEs over domestic firms has been increasingly

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contested, at least concerning European host countries (Molero & Heijs, 2002; Dachs, Ebersberger, & Lööf, 2008). At the same time, investment restrictions, as measured by the Economic Freedom Index, are increasing worldwide, and interests supporting globalization are currently weakening in many countries (Witt, 2019; Sauvant, 2009). Moreover, governments are legitimately seeking to increase the contribution of foreign direct investment (FDI) into the host economy. The idea that, from the point of view of the host country, FDI varies in its "desirability" (sic) is not new (Enderwick, 2005). However, this idea is increasingly being put into practice, and certain capacities of the foreign subsidiary (FSub), such as the potential for transferring technology, are becoming especially targeted1. The new international landscape is likely to make governments more selective than in the past regarding the types of FDI to be supported. Actually, governments have clearly stated their interest in attracting FDI in R&D since it is often believed that foreign firms may be a source of up-to-date technology for host countries (Guimón, 2009).

In the authors' view, the participation of FSubs in local cooperative2 projects deserves to be studied since it is an arrangement likely to conciliate the interests of host countries and foreign MNEs in an increasingly complex international panorama. On the one hand, technology transfers are facilitated when FSubs build local linkages (for reviews of the literature, see Rama, 2009) and local cooperation for innovation (LCI)3 constitutes one of such knowledge linkages. On the other hand, empirical research suggests that when foreign companies are able to engage in local knowledge networks, they tend to become more innovative (Almeida & Phene, 2004; Álvarez & Cantwell, 2011; Fernández Sastre, 2012). However, a wide range of situations can actually restrict the local embeddedness of FSubs, which may become enclaves within the host country, with little local interaction (Ebersberger & Herstad, 2012; Phelps, 1993). High transaction costs may impede the local embeddedness of FSubs and, hence, limit their collaboration with local networks of innovators. Consequently, research on this topic may be especially useful, not only to policy-makers, who need to better understand the relationship between innovation and FDI, but also to managers.

Mostly based on evidence provided by the Community Innovation Survey (CIS) of the European Union (EU), previous studies have offered major insights into the relationship between foreign ownership and LCI. However, it remains uncertain whether FSubs are able to create local cooperative linkages in the same way as do domestic firms, since research results remain inconclusive. In the authors' view, certain aspects of the question deserve further analysis. Firstly, little is known about the opportunities for LCI encountered by foreign MNEs in Southern European countries or in emerging economies, which are often principal receivers of FDI, since most previous analyses focus on highly industrialized countries. Secondly, sectoral quantitative studies are rare in this literature, despite the fact that these studies have the advantage of providing a more accurate picture than cross-sectional studies since problems of unobserved heterogeneity are reduced in this case. Moreover, local cooperative behaviour is influenced by characteristics of the foreign firm, such as its technological level and its *line of business* (Dachs et al., 2008; Holl & Rama, 2014; Jaklič, Damijan, Rojec, & Kunčič, 2014; Manolopoulos, Papanastassiou, & Pearce, 2005; Santangelo, 2009; Zhang et al., 2018). As a consequence, within the same host country, the cooperative arrangements of FSubs may differ by sector (Ebersberger et al., 2011; García-Sánchez et al., 2016; Guimón & Salazar-Elena, 2015). Finally, as noted by Williams & Ecker's (2011) review of the literature, very little is known regarding the types of local actors of the highest importance for FSubs since the majority of studies on foreign ownership and LCI analyse aggregated data.

This chapter attempts to contribute towards filling the aforementioned gaps in the literature. Firstly, it analyses the relationship between foreign ownership and LCI in a Southern European country (Spain) while most previous studies focus on highly industrialised countries. Secondly, it studies cooperation in specifically one *key sector*, the Information and Communication Technology (ICT) sector, which underpins major ongoing industrial transformations. Many general-purpose technologies, such as photonics, microelectronics and nanoelectronics, semiconductors, advanced technology manufacturing and Industry 4.0 are based on the development of ICT. In spite of the importance of this sector, very few quantitative studies focus specifically on foreign ownership and local cooperation for innovation in ICT. FSubs active in industries characterized by rapid worldwide technological change, such as ICT (Molero & Garcia, 2008), may potentially make a great contribution to the universities and companies of the host-country since they may bring technology not yet available locally. In the case of Spain, the ICT sector is a supplier to key national export industries, such as the automobile and the machine-tool industries (this question is revisited below). Thirdly, this chapter analyses data disaggregated in terms of types of local partners.

The authors start by asking whether, in the ICT Spanish sector, FSubs are likely to engage in cooperation for innovation with local partners. Therefore, they formulate the following research questions:

RQ1: Are FSubs more prone than unaffiliated domestic firms to cooperate locally for innovation?
RQ2: Are FSubs more prone than domestic groups to cooperate locally for innovation?

Domestic firms are used as a control group in order to detect the specificities of foreign MNEs. Fsubs are defined below.

This chapter inquires with *whom* FSubs with investments in ICT become locally embedded (e.g., clients and suppliers, universities, consultants) and identifies the types of local innovation partners that FSubs *value most highly.* The following hypothesis is formulated:

H1: FSubs show a preference for partnerships within the value chain, that is, for partnerships with their clients and their suppliers.

A control group of domestic firms is employed in order to detect whether this preference constitutes a specificity of FSubs.

Secondly, Section 2 deals with the literature review. Section 3 presents the contextual setting; Section 4, the data and methodology; and Section 5, the results and discussion. In the last section, the conclusions are drawn.

BACKGROUND

The review of the literature draws from several strands of theory: the literature on cooperation for innovation; International Business (IB) theory; network theory; and theories of technological change. The authors' research questions and hypothesis are drawn from this theoretical background.

Cooperation for innovation

Multinational enterprises perform R&D abroad for various reasons including: the adaption of their products to local norms and consumer tastes; the recruitment of well-qualified workers; and the benefits gained from public financial stimuli (Papanastassiou, Pearce, & Zanfei, 2019). They source new technology from host countries, even in those that are not at the forefront of science and technology (Almeida & Phene, 2004; Holl & Rama, 2014; Singh, 2007; Zhang, Zhao, Bournakis, Pearce, & Papanastassiou, 2018).

In so doing, MNEs use different strategies (Holl & Rama, 2014; Zhang et al., 2018), but cooperation for innovation has a greater potential than the subcontracting of R&D services or the purchase of R&D services for the transfer of new knowledge. Cooperative activities imply frequent interactions between partners, while companies subcontract R&D services for the performance of mere standardized tasks (Beneito, 2006; Dhont-Peltrault & Pfister, 2011). According to the Resource-Based View (RBV) of the firm, R&D cooperation provides a solution to the problems that the company is unable to solve by itself (Miotti & Sachwald, 2003) and certain empirical studies specifically concerning the ICT sector seem to confirm this point (Huang & Holden, 2016). In the ICT sector, cooperation between companies, universities, and research centres is often a necessity since the product life cycle is particularly rapid (Fuller, Akinwande, & Sodini, 2017) and innovation in this field involves very long-term horizons (Aschhoff et al., 2010). Innovations in ICT emerge and diffuse rapidly but also become outdated rapidly, a fact that requires persistent and costly efforts in R&D on the part of companies (Wintjes, 2019). The discussion suggests that cooperation is a necessity for ICT firms.

Foreign Subsidiaries and Domestic Firms

Table A1 in the Appendix, section *a*, shows a list of selected studies dealing with the association of foreign ownership and LCI together with their main results. The majority find that foreign ownership has a negative or, at best, a neutral effect on the probability that a company cooperates for innovation with local partners (column 5). An explanation frequently offered is that high transaction costs in the host country impede the FSub from launching local linkages similar to those of domestic firms or, specifically, those of domestic business groups (DomGs). The literature on IB maintains that FSubs often incur a *liability of foreignness* due to the social and cultural barriers that these companies encounter in host countries (Zaheer, 1995). According to this theory, FSubs may face high transaction costs (Williamson, 1985) since their social capital in the host country is often limited. This circumstance, in turn, is likely to reduce their possibilities of cooperating with innovative domestic projects since trust between partners is an essential ingredient of open innovation (Love & Roper, 2004). However, other studies point to scenarios that may facilitate the embeddedness of FSubs in the milieu and, hence, ease their participation in local networks of innovation. Previous contractual relationships, it is argued, may reduce the transaction costs incurred by the FSub and, consequently, encourage its engagement in local partnerships for innovation (Holl & Rama, 2014). In a sample of top European and US MNEs active in the electronics industry, previous experience of the market has a similarly positive effect on local cooperation (Castellani & Zanfei, 2002).

Local cooperation for innovation may also be conditioned by the perceptions of prospective local partners. A case study on the electronics consumer industry of Denmark illustrates this argument since it presents the point of view of small domestic firms that collaborate for innovation with FSubs (Christensen, Olesen, & Kjaer, 2005). According to the aforementioned authors, certain small technology-based suppliers report that they incur transaction costs when engaging in cooperation with large *global* incumbents, while the national and cultural similarity of partners contributes towards the reduction in opportunistic behaviour and, hence, contractual costs. It may be concluded that cultural distance may run both ways, and negatively affects the probability of LCI.

Foreign Subsidiaries in High-Tech Sectors

According to the network literature, firms in high-tech sectors, such as ICT, are more prone to cooperate for innovation since they face riskier and costlier innovation processes (Miotti & Sachwald, 2003). Therefore, the argument runs, cooperation may allow them to share costs and enter new technological fields. This point of view is corroborated by certain empirical studies on European countries (Carboni, 2013; Ebersberger, Herstad, Iversen, Kirner, & Som, 2011; Holl & Rama, 2019). The software, electronics, and telecom industries have indeed pioneered the adoption of open innovation; multinationals such as Philips, Xerox and Siemens are good examples (Gassmann, Enkel, & Chesbrough, 2010). In all sectors, group membership seems to positively influence the propensity to cooperate (Ebersberger et al., 2011; Holl & Rama, 2014 ; Un & Romero-Martínez, 2009).

As stated earlier, FSubs engaged in different types of business display different patterns of LCI (García-Sánchez, Molero, & Rama, 2016; Guimón & Salazar-Elena, 2015; Schmidt & Sofka, 2009). Table A1 in the Appendix, Section *b*, shows a list of selected studies that specifically focus on the local cooperative behaviour of FSubs active in high-tech sectors, including those in ICT. Research results suggest that foreign ownership is unlikely to predict local cooperation for innovation in ICT, at least when FSubs are compared to similar domestic firms, that is, to DomGs. More than ten years ago, McCann & Arita (2006) had already observed that the most significant MNEs with investments in the US and European semi-conductor industry tend to remain only vertically integrated.

Types of Partners

The preferences of firms for different types of partners have been investigated by certain studies in the field of cooperation for innovation. While striving to study the general mechanisms and determinants of cooperation for innovation, most studies do not distinguish between international and local cooperation; others do not distinguish between domestic firms and FSubs (see, for instance, De Faria, Lima, & Santos, 2010; Gallié & Roux, 2010; Lenz-Cesar & Heshmati, 2012; Srholec, 2015). As stated earlier, knowledge regarding the preferences of FSubs for, specifically, different types of *local* cooperative partnerships remains scarce (Williams & Ecker, 2011). After reviewing the literature, the aforementioned authors claim that "studies have failed to provide clarity in terms of which external partners matter" (p. 298) and have treated those partners as a cohort, although the distinction between various types of local partnerships constitutes an essential step towards understanding the embeddedness of the FSub in the host country.

However, there are certain exceptions. Guimón & Salazar-Elena (2015), on analysing firms active in several Spanish ICT industries, observe that FSubs are more likely than unaffiliated domestic firms (UDF) to cooperate for innovation with local universities, but not necessarily more than DomGs. The observation that FSubs are barely interested in partnerships for innovation with national research institutions, at least in peripheral European countries, is confirmed by a study into the cases of FSubs active in Eastern and Central Europe (Günther, Jindra, & Stephan, 2010). Holl & Rama (2014) observe that FSubs active in Spain in fact mainly concentrate their local cooperative activities on partnerships with *suppliers* and attribute the popularity of this arrangement to the importance of subcontracting production in the Spanish economy. According to the aforementioned authors, this form of governance may have contributed towards diminishing transaction costs by facilitating the familiarity of the foreign MNE with prospective local partners.

As shown below, the evolution of the ICT company has led to new formulae of governance that imply considerable communication with clients and suppliers. A study in the field of business history notes that the European telecommunication industry "has gone from adopting the national champion strategy based on the independent development and sale of high-tech innovations to an outsourcing strategy based on an industry without factories" (Calvo, 2019b, p. 130). Analyses of the Irish and the Spanish telecommunications industries corroborate the emergence of this trend and attribute it to the companies' adopting downsizing strategies following liberalization (MacKenzie, 2008; Rama & Ferguson, 2007). Another study into the Spanish case notes that outsourcing of production constitutes a major part of the strategy of FSubs, mainly electronics manufacturers, which operate in the three largest Spanish ICT clusters (Holl & Rama, 2009). Outsourcing cycles are also detected in the consumer electronics industries (Kotabe, Mol, & Ketkar, 2008). Other authors note that FSubs active in ICT have often stimulated the emergence of local spin-offs that strive to supply these companies with components and services (Benton, 1990; Iammarino, Padilla-Pérez, & von Tunzelmann, 2008). Outsourcing relationships frequently lead to cooperation for innovation between the partners since this arrangement contributes towards reducing transactions costs (Carboni, 2013; Holl & Rama, 2009). Modularity, which is "the use of an external partner to complete important aspects of the value chain", and "quasi integration", which involves other recent arrangements adopted by ICT firms, also call for considerable communication between the partners and seem to facilitate cooperation for innovation (Gentry & Elms, 2009, p. 577). Therefore, the present authors expect that, among the local partnerships available for innovation, FSubs will prefer those with their own clients and suppliers. As stated in the Introduction, this hypothesis is put to test in this chapter.

As for the ownership status of FSub local partners, very little is known probably because most of the literature on cooperation for innovation employs CIS-type surveys, which omit this information. However, an analysis of productivity suggests that, in Triad areas, FSubs source technology from domestic firms, notably native MNEs, but also from other Fsubs that operate in the host economy (Driffield, Love, & Yang, 2014). Evidence on certain developing countries and on Eastern European countries shows, moreover, that Fsubs may almost *exclusively* source technology from other Fsubs active in the same host country (Chi & Sun, 2018; Ciravegna & Giuliani, 2007; Günther, Jindra, & Stephan, 2010).

METHODS

The Model

Anonymised micro-data on LCI of both domestic and foreign companies is obtained from PITEC. This is the Spanish Technological Innovation Panel database collected by the Spanish National Statistics Institute as a contribution to the Community Innovation Survey (CIS) of the EU. Compared to other CIS-type surveys, PITEC has the advantage of providing annually collected data (while CIS has a two-year periodicity). Non-innovators are excluded from the present sample, since PITEC poses questions regarding cooperation for innovation only to firms broadly defined by the questionnaire as "innovative": companies that have launched new products onto the market, introduced new industrial processes, abandoned them during the two years prior to the survey, or have ongoing innovative activities. Other CIS-type surveys display the same characteristics (Srholec, 2009; Veugelers & Cassiman, 2004). The sample analysed in this chapter includes nearly 14,000 observations and is statistically representative of ICT firms located in Spain in 2003 - 2014.

The authors perform an econometric analysis in order to study factors that significantly influence the probability that a firm cooperates locally for innovation, foreign ownership being the independent variable of interest. Their research strategy consists of an iterative estimation of logit models with panel data:

$$P\left(LocCoopinn = 1 \mid X_i^T, \beta^T, \alpha_i\right) = \text{›} \left(\alpha_i + \beta^T X_i^T\right)$$

Variables

Following previous studies and the criteria of the Oslo Manual, a comprehensive approach to innovation is adopted (Ebersberger et al., 2011; García-Sánchez et al., 2016; Holl & Rama, 2014). In order to approximate the level of innovation of the enterprise, several innovation-related variables are employed. This methodology is likely to provide a more accurate picture than would the use of a single variable to define the innovativeness of companies. A high level of innovativeness on the part of the focal firm may attract potential partners since well-endowed firms, either technologically or commercially, are more likely to be selected in partnerships, while less well-endowed firms have fewer opportunities in the partnership "market" (Ahuja, 2000). Therefore, the focal firm is compared to the average firm operating in its two-digit industry to determine whether it is innovation-intensive. The model also controls for eleven obstacles to innovation, which are obstacles faced by the focal firm and aggregated through factor analysis and recodified into four categories: knowledge obstacles, market obstacles, competitive obstacles, and economic obstacles. Obstacles faced by the focal firm are compared to those faced by the average company in its two-digit industry. The size of the firm, export status, and previous cooperative experience are also checked. The model also controls for the possible effects of the business cycle since the 2003-2014 period analysed in this chapter is not homogeneous in terms of the national economic activity and encompasses the Great Recession. Spain was one of the European countries worst hit by the 2008 global crisis. As in other countries, the crisis negatively inhibited R&D investments of most firms (Holl & Rama, 2016), their access to credit, and the amount of public subsidies available for innovation (Cruz-Castro, Holl, Rama, & Sanz-Menéndez, 2018).

Table A2 from the Appendix indicates the definitions of the variables and Table A3 in the Appendix outlines the correlation matrix; no evidence of multicollinearity problems is found.

Dependent Variable

LocCoopInn (Local cooperation for innovation). As in the majority of studies on cooperation for innovation (Holl & Rama, 2014; Srholec, 2015; Veugelers & Cassiman, 2004), the dependent variable used in the model is a dummy variable that indicates whether the focal company cooperated for innovation with external partners located in the host country. PITEC provides information on the *location* of partners for innovation, not on their nature: "local" partners may be domestic firms and institutions, such as universities, or other FSubs with investments in Spain. As stated earlier, "external" refers in this chapter to partners located in Spain that are not part of the company and/or the business group. Cooperative activities are defined here as two separate organisations joining forces to share and develop knowledge in order to ameliorate their technological performance. Cooperation for innovation includes R&D cooperation. In contrast, the acquisition of R&D services via the market or via R&D subcontracting are not included.

Independent Variables

FSub. "Foreign Subsidiary". This is the variable of interest analysed in the model. The database distinguishes between two different categories of firms: unaffiliated companies, and firms belonging to a group. Within the latter, information is provided regarding the location of the headquarters of the company. This dummy variable takes value 1 if the headquarters of the group are in a foreign country and/or capital ownership is over 50% foreign. Other studies employing evidence from CIS-type surveys utilize a similar methodology (Srholec, 2009).

DomG. **"**Domestic Group" *is* a dummy variable, which takes value 1 if the headquarters of the firm are in Spain.

UDF is a dummy variable, which takes value 1 if the firm is an "Unaffiliated Domestic Firm".

The following independent variables denote intensity as a comparison with the two-digit host industry (domestic and foreign firms included). Two-digit industries include: informatics, electronics and optical products, telecommunications; computer programming, consultancy and related activities; other information and communication services; artistic broadcasting and entertainment activities.

The authors' objective is to understand the degree of embeddedness of the FSub when characteristics of the host industry are taken into account. Intensity is indicated by an "*i_*" before the name of the variable. The following variables are dummies that indicate whether the focal firm is more innovation-intensive than the average firm that operates in its two-digit industry. When the variables display a positive, statistically significant coefficient, then the focal firm is more innovation-intensive than average.

*i_intRDexp***:** Internal R&D expenditures. This variable indicates a substantial commitment to R&D on the part of the firm.
i_extRDexp: External R&D expenditures.
i_other InnExp: Innovation expenditures other than R&D, such as acquisitions of licences.

i_RDpers: Number of R&D employees. Following Cohen and Levinthal (1989), this variable indicates whether the focal firm enjoys more absorptive capacity than does the average company in its two-digit industry. Absorptive capacity is a crucial consideration for a firm striving to profit from cooperation for innovation.

*i_newmar***:** Share of products new to the market in turnover. This variable is essential to define innovators or, specifically, radical innovators (Zouaghi et al., 2018; Álvarez & Cantwell, 2011) since it points to the ability of the firm to introduce primary innovation into the market.

i_newent: Share of products new to the enterprise in turnover. Following Zouaghi et al. (2018), this variable is employed to assess the capacity of the firm to produce incremental innovation, that is ameliorations of a product or an industrial process.

*i_interinfo***:** This variable denotes the perception of the firm regarding the usefulness of internal information coming from both the company itself and its group. Multinational enterprises are likely to value their own sources more highly than domestic firms value their own sources (Dachs et al., 2008; Molero & Heijs, 2002).

i_ownfund: Share of its own resources in the total resources used by the focal company to finance R&D.

Obstacles. Herein, 11 obstacles to innovation are taken into account. The independent variables for obstacles employed in the model include: knowledge obstacles (*i_knowobst),* economic obstacles (*i_econobst)*, market obstacles (*i_marketobst*), *and* competitive obstacles (*i_competobst)*. In this case, a positive and statistically significant coefficient means that the firm faces a higher-than-average obstacle.

crisis. The 2008-2014 period is used here to signal the in-crisis cooperative performance of firms. Following previous studies, the final year of the crisis is taken as 2014 since this is the first year when an increase in the Spanish GDP is displayed after its inception (García-Sánchez & Rama, 2020; Zouaghi et al, 2018).

Following other analyses (Ebersberger et al., 2011; Holl & Rama, 2014 ; Miotti & Sachwald, 2003), the model controls for the size and export activities of the company.

i_size: Size of the firm measured as the number of employees.
l_size: Logarithm of the number of employees.
mdoue: Indicates whether the focal firm exports goods or services to the EU market.

previousLocCoop. In a sample of Spanish manufacturing and service firms, Belderbos et al. (2015) find that persistence is the most common pattern of collaboration. Firms that cooperated previously are more likely to select suitable partners and joint innovative projects. They are therefore probably more prone to engage in LCI than those that lack recent cooperation experience. Furthermore, previous experience in the host country may have reduced the *liability of foreignness* faced by FSubs. The variable takes the value 1 when the focal firm was engaged in LCI in the two previous consecutive years, 0 otherwise. As observed by the aforementioned authors, there is little scope for longer survey lags, given the limited panel structure of the PITEC data.

H1 is tested by using a Chi-squared test for statistical significance (whether there is a significant difference between expected and observed frequencies in one or more categories) combined with Cramer's V test for substantive significance.

CONTEXT SETTING

In 2015, the Spanish ICT sector ranked fifth in the EU in terms of added value, after those of Germany, the UK, France, and Italy (Mas et al., 2018). In Spain, the number of ICT firms increased from 29,838 in 2011 to 33,176 in 2016, whereby the most dynamic subsectors in this regard were informatics and the media. In 2017, employment accounted for approximately half a million people, and value added amounted to 4.2% of Spanish GDP (Muñoz López et al., 2017).

Many firms operate exclusively in *"business-to-business"* markets since the outsourcing of production is highly important in this Spanish sector (Alfonso-Gil & Vazquez-Barquero, 2010; Holl & Rama, 2009; López-Bayon & Gonzalez-Diaz, 2010). As stated earlier, the ICT sector is a major supplier to two key national export industries: automobiles and machine tools. Spain is the second largest EU producer of cars after Germany4 and the primary producer of industrial vehicles5. Furthermore, 85% of the Spanish production of cars is exported, as is 60% of its electronic components for automobiles. The Spanish automobile industry has attracted many of the most important global MNEs, such as Ford, Renault, Citroën and Volkswagen. With the recent developments in electric vehicles, autonomous vehicles, shared services platforms, and new battery technologies, the automobile industry is becoming globally more dependent than ever on ICT, which account for an increasing share of the added value of vehicles. The Spanish machine-tool industry, another major client of the national ICT sector, is the third-largest producer and exporter of machine tools in the EU6, and has recently become internationalised (Valdaliso, 2018). The aeronautical industry, which is controlled by large domestic groups specialising in defence electronics and cyber-defence (Calvo, 2019), subcontracts a significant part of its production from ICT subcontractors (Díaz-Mora, 2008). Airbus España, a Spanish affiliate of Airbus Industrie based in Toulouse (France), works in close connection to large DomGs, such as Indra, a large native MNE that specialises in electronic equipment and simulation products (Alfonso-Gil & Vazquez-Barquero, 2010). Large native MNEs, such as Telefonica and Indra, play a major role in European cooperation programmes since they function as central nodes, by linking smaller domestic ICT companies to other members of the consortium located either in Spain or elsewhere in the EU (Alfonso-Gil & Vazquez-Barquero, 2010; Sanz Menéndez, Fernández Carro, & García, 1999).

Table 1 displays information concerning inward and outward FDI in the ICT Spanish sector. With liberalisation, FDI was strongly attracted to the Spanish ICT sector and mainly to its telecommunication industry (Rama & Ferguson, 2007). In that period, many domestic firms that faced difficulties were purchased by foreign investors but it seems unlikely that the new owners took advantage of the existing business networks of the acquired company; instead, in many cases, facilities were downsized and repurposed for wholesaling and services (García Calvo, 2020). Spain has recently gained a foothold as an exporter of capital in telecommunications and machine tools (Fernández-Otheo & Myro, 2014; Rama & Ferguson, 2007; Valdaliso, 2018; Valdaliso, Elola, Aranguren, & López, 2011). Telefonica, a large native MNE with investments in telecommunication services, has rapidly expanded in Latin America and elsewhere. In the computing and electronics industries, companies of all sizes have also become internationalised (Rama & Ferguson, 2007; Valdaliso et al., 2011).

Table 1. Inward and outward FDI stock in ICT industries. Spain, 2007-2015 (in billions of €)

Inward FDI in ICT industries			
Year	Informatics and electronics industries	Information services	Telecommunication Services
2007	6.3	10.0	227
2015	7.7	13.7	233
Outward FDI in ICT industries			
2007	4.9	4.9	397
2015	6.1	24.2	342

Source: Authors' own based on official FDI data. Ministry of Economics, Industry and Competitiveness, Government of Spain. http://datainvex.comercio.es/principal_invex.aspx . As of December 2017. Latest available data.

RESULTS

Descriptive Statistics

Unaffiliated Domestic Firms account for 53% of the sample firms, DomGs for 35%, and FSubs for 12%. Most of the sampled companies operate in the subsector of programming and consulting (53%) and informatics products (22%); the rest are in other informatics services, telecommunications, etc. A Chi-squared test (available upon request) shows that there is a statistical association between the type of company and type of ICT industry; this is confirmed by Cramer's V test. FSubs are overrepresented in other informatics services, informatics products, and especially in telecommunications. FSubs are larger than domestic firms in terms of annual turnover (195,381,000 €) and DomGs (109,369,600 €) are smaller. UDFs are very small enterprises with a turnover of only 4,769,500 €, although their proportion of employees working in R&D is the highest in the sample.

Are Foreign Subsidiaries Cooperating Locally for Innovation?

The overall significance of the models is presented at the bottom of Table 2: all of the models have Prob>Chi2 at 0.000 level, over 3,500 observations in the lowest case, and rho at approximately 0.5.

Table 2. Local Cooperation for Innovation. Foreign Subsidiaries versus Domestic Firms

	All ICT firms		UDF/ Foreign subsidiaries		Only ICT Groups	
	Coeff./se	Dydx	Coeff./se	dydx	Coeff./se	dydx
	(1)	(2)	(3)	(4)	(5)	(6)
LocCoopInn(dep.var.)						
previousLocCoop	1.79124***	0.14505	1.72736***	0.12175	1.94985***	0.20304
	(0.132)		(0.170)		(0.184)	
i_intRDexp	-0.18579+	-0.01505	-0.11337	-0.00799	-0.47212**	-0.04916
	(0.106)		(0.134)		(0.162)	
i_extRDexp	0.57914***	0.04690	0.81737***	0.05761	0.15788	0.01644
	(0.139)		(0.176)		(0.215)	
i_RDpers	0.46343***	0.03753	0.28513	0.02010	0.81815***	0.08519
	(0.136)		(0.194)		(0.179)	
l_size	0.25562***	0.02070	0.21322***	0.01503	0.27601***	0.02874
	(0.040)		(0.054)		(0.056)	
i_newmar	0.37987***	0.03076	0.24853+	0.01752	0.33504*	0.03489
	(0.111)		(0.147)		(0.162)	
i_newent	0.50762***	0.04111	0.31062*	0.02189	0.84371***	0.08786
	(0.109)		(0.142)		(0.161)	
i_interinfo	0.32347***	0.02619	0.48074***	0.03388	0.30977*	0.03226
	(0.098)		(0.125)		(0.145)	
i_knowobst	0.28871**	0.02338	0.27698*	0.01952	0.35493*	0.03696
	(0.098)		(0.124)		(0.147)	
i_competobst	0.18799+	0.01522	0.15745	0.01110	0.35150*	0.03660
	(0.099)		(0.128)		(0.147)	
i_marketobst	-0.24970**	-0.02022	-0.25410*	-0.01791	-0.15241	-0.01587
	(0.095)		(0.121)		(0.143)	
domGroup	0.34610**	0.02843				
	(0.133)					

continues on following page

Table 2. Continued

	All ICT firms		UDF/ Foreign subsidiaries		Only ICT Groups	
	Coeff./se	**Dydx**	**Coeff./se**	**dydx**	**Coeff./se**	**dydx**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Fsub	0.53853*	0.04595				
	(0.214)					
Fsub			0.90770***	0.06398	0.15422	0.01606
			(0.256)		(0.207)	
Constant	-7.58027***		-7.25067***		-7.58996***	
	(0.612)		(0.797)		(0.912)	
lnsig2u						
Constant	1.14571***	1.28781***	1.11308***			
	(0.112)		(0.138)		(0.171)	
Prob > chi^2	0.000		0.000		0.000	
Number of cases	9,663		6,831		3,595	
sigma_u	1.77333		1.90390		1.74462	
rho	0.48872		0.52422		0.48057	

Source: Authors' own based on PITEC.
+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001
Note: Only those variables with statistically significant coefficients are included

According to the econometric results, the variables denoting FSubs and DomGs have positive, statistically significant coefficients (Table 2). The fact of belonging to a business group, either national or multinational, increases the probability that a company engages in LCI, even when the size of the firm and other factors that may influence the propensity to cooperate are taken into account (column 1). This result confirms those of previous studies (subsection 2.3). Foreign ownership increases, by nearly 5%, the probability that a company engages in LCI, while belonging to a DomG increases this probability by 2% (column 2). Nevertheless, when the test is repeated in a subsample of domestic and foreign business groups, then the coefficient of *FSub* is not statistically significant (column 5). It can be concluded that FSubs are more prone than unaffiliated domestic firms to cooperate for innovation with local partners (RQ1) but not more prone than are domestic business groups (RQ2). A large size and previous cooperative experience are positively associated to the decision to engage in LCI in all types of firms (column 1). Previous cooperative experience increases, by nearly 15%, the probability of LCI in the whole sample (column 2) and also incurs a 20% increase in the probability of LCI in the subsample of business groups (column 6). This result confirms those of Belderbos et al. (2015) on the importance of previous experience.

Firms that face greater barriers to innovation in terms of knowledge obstacles and competition obstacles tend to cooperate with local partners; both variables display positive, statistically significant coefficients (column 1). These barriers increase the probability of LCI by nearly 2% each across the whole sample (column 2) and by nearly 4% each in the subsample of business groups (column 6). These results confirm the RBV of the firm in that companies that face difficulties innovating tend to resort to cooperation with external partners (Miotti & Sachwald, 2003). However, the coefficient of *i_marketobst* is negative and statistically significant in the whole sample (column 1), which indicates that companies facing *fewer-than-average* market barriers to innovation tend to engage in LCI. According to PITEC, firms that face only a few market obstacles to innovation are those that enjoy good information regarding the market and/or those that operate in markets not controlled by incumbents. The econometric results suggest, therefore, that firms launch cooperative projects when they expect that the customer will accept their new products and/or when their market is not already controlled by well-established companies. These are certainly relevant considerations for the UDFs, which constitute the bulk of the sample firms. Furthermore, the other side of the coin, that is, the point of view of prospective local partners, also needs to be considered: firms facing fewer market obstacles to innovation may attract those local innovators that lack market knowledge and market channels, and also lack any possibility to control the market for their innovative products and/or industrial processes. This is clearly the case of small local producers and of institutions, such as universities. However, the coefficient of *i_marketobst* loses statistical significance in the subsample of business groups (column 5), which implies that, in this case, market obstacles have a neutral effect on the propensity to engage in LCI. The majority of business groups probably enjoy good market information and/or are dominant in their respective markets. It may be concluded that greater-than-average market difficulties innovating are more of a deterrent for LCI in unaffiliated domestic firms. This is the case in which the RBV of the firm is not confirmed since market barriers to innovation are unlikely to bring the firm to engage in LCI.

Partners That Matter for the Foreign Subsidiary

In Table 3, the three types of companies, UDF, DomGs, and FSubs, are compared with respect to their preferences towards the selection of types of local partners.

The first row indicates the percentage of UDF, DomGs, and FSubs that report collaboration for innovation with local partners, and shows that the share of FSubs that collaborate (more than 26%) is the highest of the three categories. Only 10% of the UDF cooperate with local partners, and DomGs occupy an intermediate position that is closer to that of FSubs (21%).

In Table 3, the three groups of firms are compared (UDFs, DomGs, and FSubs) and the response variable is made up of four types of local partners:

- Clients/suppliers, that is, partnerships within the value chain
- Competitors
- Laboratories, consultants, public research centres, and technical centres
- Universities

Responses are not mutually exclusive: a firm may cooperate at the same time with two or more types of partners. The percentages displayed in Table 3 account for the “Yes” responses, that is, the percentage of UDF, DomGs, and FSubs that report cooperation with each type of local partner.

The null hypothesis that is being tested is that all groups of firms prefer the same type of partner to take part in LCI. According to the Chi-squared test, a significant association exists (*p£0.01* for all rows) between groups of companies and types of local partners; therefore, the null hypothesis is rejected. Cramer’s V test ratifies this result.

Table 3. Cooperation with various types of partners: unaffiliated domestic firms (UDF), domestic groups (DomGs), and foreign subsidiaries (Fsub)

	COOPERATION WITH LOCAL PARTNERS	Unaffiliated domestic firms		Domestic Groups		Foreign subsidiaries						Total	
		%	N	%	N	%	N		*Chi2*	*p*	*Cramer's V*	%	N
1	Any partner outside the group	10.19	731	21.03	693	26.41	244	***	323,8587	0.000	0.1686	16.64	1,668
2	Value chain (clients or suppliers)	0.00	0	4.95	163	18.72	173	***	1.10E+03	0.000	0.3061	2.95	336
3	Competitors (firms in the same industry)	0.00	0	2.12	70	1.84	17	***	149,8474	0.000	0.1147	0.76	87
4	Labs. / Consultants / Public Research Centres / Technological centres	9.42	676	17.17	566	16.45	152	***	143,0856	0.000	0.1121	12.23	1,394
5	Universities	2.08	149	7.77	256	7.14	66	***	207,5861	0.000	0.1350	1.13	471
6	Number of cases reporting cooperation		7,176		3,296		924						11,396
7	**Total number of cases**		**8,555**		**4,100**		**1,267**						**13,922**

Note: * p<0.05, **p<0.01, *** p<0.001

Source: Authors' own based on PITEC.

FSubs that cooperate locally report that their preferred partnerships are those with clients/suppliers: they favour partnerships along the value-chain. Nearly 19% of FSubs state that they cooperate with this type of partner: this is well above the percentage reported for these partnerships by the average sample firm (3% of the sample firms). Therefore, H1 is supported. The preference for clients/suppliers marks a clear difference between FSubs and domestic firms and is in accordance with the findings of Holl & Rama (2014) in a sample of Spanish manufacturing and service firms. Since, in the current sample, none of the UDF report collaboration with clients/suppliers or with competitors, one can infer that within the ICT sector, FSubs cooperate exclusively with other foreign subsidiaries and with domestic business groups but not with unaffiliated domestic firms, except those that exclusively provide R&D services; for instance, laboratories. FSubs also value collaboration with laboratories/consultants/public research centres/technological centres. This type of partnership is clearly preferred by domestic firms.

In certain ICT national sectors, such as those of China and Costa Rica, FSubs collaborate for innovation almost exclusively among themselves (Chi & Sun, 2018; Ciravegna & Giuliani, 2007). However, this is not likely to occur in Spain. Although PITEC data fails to allow the researcher to identify the partners regarding their foreign status (it only provides their geographic location), certain studies ascertain that Fsubs with investments in the ICT Spanish sector cooperate for innovation both with other ICT FSubs and with ICT DomGs (Alfonso-Gil & Vázquez-Barquero, 2010; Sanz-Menéndez et al., 1999; Calvo, 2019a). The question is relevant to the purpose of this chapter: there are reasons to believe that the cooperative activities of foreign subsidiaries with each other improve national capabilities less than do the cooperative activities of foreign subsidiaries with *domestic* actors, which may face difficulties in accessing international sources of technology.

CONCLUSION

This chapter has striven to understand whether foreign subsidiaries are able to overcome barriers such as the *liability of foreignness* and build cooperative linkages with local innovators. The Spanish ICT sector was selected for analysis. Results of an econometric model show that foreign subsidiaries are more likely than unaffiliated domestic firms to cooperate for innovation with local partners but not more likely than domestic business groups, even when the size of the firm, the obstacles it faces to innovate, and other factors that may influence cooperation are all controlled for. One possible explanation is that the current access of domestic groups to international sources of knowledge has made them highly attractive to skilled prospective partners at the time when they have greater opportunities to engage in local cooperation than foreign firms, since they are more embedded in the milieu (Cozza et al., 2018; Holl & Rama, 2019). Another statistical test shows that the types of local partners of the highest importance for ICT foreign subsidiaries are clients and suppliers, since these firms take part mainly in local partnerships across the value-chain; compared to domestic firms, this preference is a clear specificity of foreign firms. Within the ICT sector, the foreign subsidiaries that cooperate with suppliers/clients or competitors engage in partnerships exclusively with other foreign subsidiaries and with domestic business groups but not with unaffiliated domestic firms. However, they may cooperate with small firms that exclusively provide R&D services, such as laboratories. They may also cooperate with unaffiliated domestic firms active in other industries, but the data remains inadequate for this hypothesis to be tested.

In many other host countries, foreign subsidiaries tend to remain isolated (Appendix- Table A1 and Section 2), and foreign ownership even has a *negative* impact on local cooperation for innovation in those that are not at the forefront of science and technology (Ebersberger et al., 2011). Why is the case of Spain such a success story? There are probably three main reasons for this intriguing result. Firstly, there is a substantial diffusion of production subcontracting in the Spanish economy (Díaz-Mora, 2008; Holl & Rama, 2009; López-Bayon & González-Diaz, 2010), and a noticeable involvement of foreign subsidiaries in such practices. Furthermore, the participation of foreign subsidiaries in outsourcing R&D (Holl & Rama, 2014) has probably generated trust between prospective partners and paved the way for cooperation for innovation, which implies tight linkages and complex technological exchanges. Secondly, the existence of competitive *downstream* industries in the host country may constitute a powerful attractor for the ICT foreign subsidiaries analysed herein since firms are more likely to cooperate vertically for innovation than with competitors. Thirdly, the confluence of a large number of foreign MNEs active in various sectors of the host economy may favour local cooperation for innovation. Exclusive client-supplier relationships are sometimes extended from the home country of these companies into the host country (Hansen, 2016; Rama & Ferguson, 2007). These foreign firms may have built *global* alliances, whereby cooperation in Spain constitutes only a part of their worldwide linkages. While it is not in the power of host governments to reproduce the latter two reasons for the success of Spain in attracting ICT foreign subsidiaries willing to cooperate locally, stimuli to the outsourcing of production may present a feasible tool for the promotion of local cooperation for innovation in the medium-term. However, successful as it is, the Spanish case shows that attracting foreign subsidiaries, even if many of them are willing to cooperate locally, is no guarantee of the access of small firms to up-to-date technology: specific policy measures targeting this group are needed. As predicted by Cantwell (1995), the globalization of technology "*does not kill the need for national policies*". As for managers, they need to bear in mind that the world is changing. The same global forces that have facilitated the worldwide expansion of foreign MNEs have also facilitated the emergence of indigenous MNEs and the internationalization of the R&D activities of domestic firms even within the periphery of Europe. This circumstance has made these domestic firms highly competitive in the "market" for local partnerships. This calls for a redoubled effort on the part of the foreign firm to embed itself in the host country. Subcontracting of production and persistence may be important tools in this respect.

One limitation of our analysis is that, although cooperation of ICT firms with downstream industries is likely to be highly important, the data available remains unsuitable for the detection of inter-industry collaboration. Another limitation of CIS-type surveys, such as that employed in this chapter, is that they fail to provide information on the ownership status, domestic or foreign, of the *local* partners of foreign multinationals. In order to mitigate this difficulty and, especially to exclude the possibility that the sample foreign subsidiaries cooperate for innovation exclusively with other foreign subsidiaries that operate in Spain, the authors consulted sources of secondary information. Finally, the analysis of the breadth of local innovative networks in which the foreign subsidiary is engaged is an avenue for future research.

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REFERENCES

Ahuja, G. (2000). The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal*, *21*(3), 317–343. doi:10.1002/(SICI)1097-0266(200003)21:3<317::AID-SMJ90>3.0.CO;2-B

Alfonso-Gil, J., & Vazquez-Barquero, A. (2010). Networking and innovation: Lessons from the aeronautical clusters of Madrid. *International Journal of Technology Management*, *50*(3), 337–355.

Almeida, P., & Phene, A. (2004). Subsidiaries and knowledge creation: The influence of the MNC and host country on innovation. *Strategic Management Journal*, *25*(8-9), 847–864. doi:10.1002mj.388

Álvarez, I., & Cantwell, J. (2011). International integration and mandates of innovative subsidiaries in Spain. *Institutions and Economies*, *3*(3), 415–444.

Arvanitis, S., & Bolli, T. (2013). A Comparison of National and International Innovation Cooperation in Five European Countries. *Review of Industrial Organization*, *43*(3), 163–191. doi:10.100711151-012-9348-6

Aschhoff, B., Crass, D., Cremers, K., Grimpe, C., Rammer, C., Brandes, F., & Montalvo, C. (2010). *European competitiveness in key enabling technologies*. Retrieved from ZEW Manheim.

Belderbos, R., Carree, M., Lokshin, B., & Fernández Sastre, J. (2015). Inter-temporal patterns of R&D collaboration and innovative performance. *The Journal of Technology Transfer*, *40*(1), 123–137. doi:10.100710961-014-9332-4

Beneito, P. (2006). The innovative performance of in-house and contracted R&D in terms of patents and utility models. *Research Policy*, *35*(4), 502–517. doi:10.1016/j.respol.2006.01.007

Benton, L. (1990). High-tech Cottage Industry? Productive decentralization in Madrid's Electronics Industry. In L. Benton (Ed.), *Invisible Factories*. University of New York.

Binh, T. T. C., & Linh, N. M. (2013). Supplier system and knowledge transfer within the production networks of electronics MNCs in Vietnam. *Asian Journal of Technology Innovation, 21*(sup1), 119-138. doi:10.1080/19761597.2013.819237

Calvo, A. (2019). Consolidation and rationalization of the public companies in Spain: The information and communication technologies (ICT) holding. *Journal of Evolutionary Studies in Business*, *4*(1), 142–179.

Calvo, A. (2019a). Sector privado y sector público en la industria española de alta tecnología: Indra. *Biblio3w, 24*(1259), 1-36.

Calvo, A. (2019b). World telecommunications equipment industry from the national champions to outsourcing: The case of ALCATEL. *The International Journal of Business Management and Technology*, *3*(6), 130–152.

Cantwell, J. (1995). Innovation in a global world Globalisation does not kill the need for national policies. *New Economy*, *2*(2), 66–70. doi:10.1111/j.1468-0041.1995.tb00054.x

Carboni, O. A. (2013). Heterogeneity in R&D cooperation: An empirical investigation. *Structural Change and Economic Dynamics*, *25*, 48–59. doi:10.1016/j.strueco.2013.02.003

Castellani, D., & Zanfei, A. (2002). Multinational experience and the creation of linkages with local firms: Evidence from the electronics industry. *Cambridge Journal of Economics*, *26*(1), 1–25. doi:10.1093/cje/26.1.1

Chi, J., & Sun, L. (2018). Network position, technological distance and firm's cooperation innovation. *American Journal of Industrial and Business Management*, *8*(11), 2180–2190. doi:10.4236/ajibm.2018.811145

Christensen, J. F., Olesen, M. H., & Kjaer, J. S. (2005). The industrial dynamics of Open Innovation - Evidence from the transformation of consumer electronics. *Research Policy*, *34*(10), 1533–1549. doi:10.1016/j.respol.2005.07.002

Ciravegna, L., & Giuliani, E. (2007). MNC-dominated clusters and the upgrading of domestic suppliers: the case of Costa Rican electronics and medical device industries. In R. Leoncini & S. Montresor (Eds.), *Dynamic Capabilities between Firm Organization and Local Systems of Production* (pp. 236–263). Routledge.

Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: The two faces of R & D. *Economic Journal (London)*, *99*(397), 569–596. doi:10.2307/2233763

Cozza, C., Perani, G., & Zanfei, A. (2018). Multinationals and R&D cooperation: Empirical evidence from the Italian R&D survey. *Economics and Politics*, *35*(2), 601–621. doi:10.100740888-018-0104-8

Cozza, C., & Zanfei, A. (2016). Firm heterogeneity, absorptive capacity and technical linkages with external parties in Italy. *The Journal of Technology Transfer*, *41*(4), 872–890. doi:10.100710961-015-9404-0

Cruz-Castro, L., Holl, A., Rama, R., & Sanz-Menéndez, L. (2018). Economic crisis and company R&D in Spain: Do regional and policy factors matter? *Industry and Innovation*, *25*(8), 729–751. doi:10.1080/13662716.2017.1355231

Dachs, B., Ebersberger, B., & Lööf, H. (2008). The innovative performance of foreign-owned enterprises in small open economies. *The Journal of Technology Transfer*, *33*(4), 393–406. doi:10.100710961-007-9058-7

De Faria, P., Lima, F., & Santos, R. (2010). Cooperation in innovation activities: The importance of partners. *Research Policy*, *39*(8), 1082–1092. doi:10.1016/j.respol.2010.05.003

Dhont-Peltrault, E., & Pfister, E. (2011). R&D cooperation versus R&D subcontracting: Empirical evidence from French survey data. *Economics of Innovation and New Technology*, *20*(4), 309–341. doi:10.1080/10438591003669743

Díaz-Mora, C. (2008). What factors determine the outsourcing intensity? A dynamic panel data approach for manufacturing industries. *Applied Economics*, *40*(19), 2509–2521. doi:10.1080/00036840600970179

Driffield, N., Love, J. H., & Yang, Y. (2014). Technology sourcing and reverse productivity spillovers in the multinational enterprise: Global or regional phenomenon? *British Journal of Management*, *25*(S1), 24–41. doi:10.1111/1467-8551.12009

Ebersberger, B., & Herstad, S. J. (2012). Go abroad or have strangers visit? On organizational search spaces and local linkages. *Journal of Economic Geography*, *12*(1), 273–295. doi:10.1093/jeg/lbq057

Ebersberger, B., Herstad, S. J., Iversen, E., Kirner, E., & Som, O. (2011). *Analysis of innovation drivers and barriers in support of better policies. Economic and market intelligence on innovation. Open innovation in Europe: effects, determinants and policy*. European Commission.

Enderwick, P. (2005). Attracting "desirable" FDI: Theory and evidence. *Transnational Corporations*, *14*(2), 93.

Fernández-Otheo, C. M., & Myro, R. (2014). La inversión de las empresas españolas en el exterior: patrón sectorial y espacial, y rentabilidad. In R. Myro & M. E. Álvarez López (Eds.), *España en la inversión directa internacional* (pp. 245–296). Instituto de Estudios Económicos.

Fernández Sastre, J. (2012). *Efectos y determinantes de la cooperación para la innovación tecnológica: un estudio empírico sobre un panel de datos de empresas localizadas en España* (Ph.D. Thesis). Universidad Autónoma de Madrid, Madrid.

Fuller, D. B., Akinwande, A. I., & Sodini, C. G. (2017). The globalization of R&D's implications for technological capabilities in MNC home countries: Semiconductor design offshoring to China and India. *Technological Forecasting and Social Change*, *120*, 14–23. doi:10.1016/j.techfore.2017.03.032

Gallié, E.-P., & Roux, P. (2010). Forms and determinants of R&D collaborations: Evidence based on French data. *Industry and Innovation*, *17*(6), 551–576. doi:10.1080/13662716.2010.530838

García Calvo, A. (2020). State-firm Coordination and Upgrading in Spain's and Korea's ICT Industries. *New Political Economy*. Advance online publication. doi:10.1080/13563467.2019.1708882

García-Sánchez, A., Molero, J., & Rama, R. (2016). Are "the best" multinationals cooperating locally for innovation? The case of an intermediate country. *Science & Public Policy*, *43*(4), 532–545. doi:10.1093cipolcv057

García-Sánchez, A., & Rama, R. (2020). Foreign ownership and domestic cooperation for innovation during good and harsh economic times. *Int.J. of Multinational Corporation Strategy*. 3(1), 4-25.

Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R & D Management*, *40*(3), 213–221. doi:10.1111/j.1467-9310.2010.00605.x

Gentry, R. J., & Elms, H. (2009). Firm partial modularity and performance in the electronic manufacturing services industry. *Industry and Innovation*, *16*(6), 575–592. doi:10.1080/13662710903371074

Guimón, J. (2009). Government strategies to attract R&D-intensive FDI. *Journal of Technology Transfer, 34*(4), 364-379. doi:10.100710961-008-9091-1

Guimón, J., & Salazar-Elena, J. C. (2015). Collaboration in innovation between foreign subsidiaries and local universities: Evidence from Spain. *Industry and Innovation*, *22*(6), 445–466. doi:10.1080/13662716.2015.1089034

Günther, J., Jindra, B., & Stephan, J. (2010). FDI and The National Innovation System—Evidence from Central and Eastern Europe. *World Scientific Book Chapters*, 303-332.

Hansen, M. W., & Hoenen, A. (2016). Global oligopolistic competition and foreign direct investment: Revisiting and extending the literature. *Critical Perspectives on International Business*, *12*(4), 369–387. doi:10.1108/cpoib-03-2014-0017

Holl, A., & Rama, R. (2009). The spatial patterns of networks, hierarchies and subsidiaries. *European Planning Studies, 17*(9), 1261-1281.

Holl, A., & Rama, R. (2014). Foreign subsidiaries and technology sourcing in Spain. *Industry and Innovation*, *21*(1), 43–64. doi:10.1080/13662716.2014.879254

Holl, A., & Rama, R. (2016). Persistence of innovative activities in times of crisis: The case of the Basque Country. *European Planning Studies*, *24*(10), 1863–1883. doi:10.1080/09654313.2016.1204426

Holl, A., & Rama, R. (2019). Local cooperation for innovation in ICT—Domestic groups with collaborations for innovation abroad and foreign subsidiaries. *Science & Public Policy*, *46*(4), 599–610. doi:10.1093cipolcz013

Huang, S., & Holden, D. (2016). The R&D Boundaries of the Firm: A Problem-Solving Perspective. *International Journal of the Economics of Business*, *23*(3), 287–317. doi:10.1080/13571516.2016.1156247

Iammarino, S., Padilla-Pérez, R., & von Tunzelmann, N. (2008). Technological Capabilities and Global–Local Interactions: The Electronics Industry in Two Mexican Regions. *World Development*, *36*(10), 1980–2003. doi:10.1016/j.worlddev.2007.10.022

Jaklič, A., Damijan, J. P., Rojec, M., & Kunčič, A. (2014). Relevance of innovation cooperation for firms' innovation activity: The case of Slovenia. *Economic Research-Ekonomska Istraživanja*, *27*(1), 645–661. doi:10.1080/1331677X.2014.975513

Kotabe, M., Mol, M. J., & Ketkar, S. (2008). An evolutionary stage model of outsourcing and competence destruction: A Triad comparison of the consumer electronics industry. *Management Innovation Review*, *48*(1), 65–93. doi:10.100711575-008-0004-1

Lenz-Cesar, F., & Heshmati, A. (2012). An econometric approach to identify determinants of cooperation for innovation among firms. *Applied Economics Letters*, *19*(3), 227–235. doi:10.1080/13504851.2011.572836

López-Bayon, S., & González-Diaz, M. (2010). Indefinite contract duration: Evidence from electronics subcontracting. *International Review of Law and Economics*, *30*(2), 145–159. doi:10.1016/j.irle.2010.03.001

Love, J. H., & Roper, S. (2004). The organisation of innovation: Collaboration, cooperation and multifunctional groups in UK and German manufacturing. *Cambridge Journal of Economics*, *28*(3), 379–395. doi:10.1093/cje/28.3.379

MacKenzie, R. (2008). From networks to hierarchies: The construction of a subcontracting regime in the Irish telecommunications industry. *Organization Studies*, *29*(6), 867–886. doi:10.1177/0170840608088706

Manolopoulos, D., Papanastassiou, M., & Pearce, R. (2005). Technology sourcing in multinational enterprises and the roles of subsidiaries: An empirical investigation. *International Business Review*, *14*(3), 249–267. doi:10.1016/j.ibusrev.2005.01.002

Mas, M., Fernández de Guevara, J., Robledo, J. C., Cardona, M., Lopez-Cobo, M., Righi, R., & Samoili, S. (2018). *The 2018 PREDICT Key Facts Report. An analysis of ICT R&D in the EU and beyond*. European Commission.

McCann, P., & Arita, T. (2006). Clusters and regional development: Some cautionary observations from the semiconductor industry. *Information Economics and Policy*, *18*(2), 157–180. doi:10.1016/j.infoecopol.2005.12.001

Miotti, L., & Sachwald, F. (2003). Co-operative R&D: why and with whom?: An integrated framework of analysis. *Research Policy*, *32*(8), 1481–1499. doi:10.1016/S0048-7333(02)00159-2

Molero, J., & Garcia, A. (2008). The innovative activity of foreign subsidiaries in the Spanish Innovation System: An evaluation of their impact from a sectoral taxonomy approach. *Technovation*, *28*(11), 739–757. doi:10.1016/j.technovation.2008.03.005

Molero, J., & Heijs, J. (2002). Differences of innovative behaviour between national and foreign firms: Measuring the impact of foreign firms on national innovation systems. *International Journal of Entrepreneurship and Innovation Management*, *2*(2/3), 122–145. doi:10.1504/IJEIM.2002.000478

Muñoz López, L., Antón Martínez, P., & San Agustín García, A. (2017). *Informe anual del sector TIC y de los contenidos en España 2017*. Gobierno de España.

Papanastassiou, M., Pearce, R., & Zanfei, A. (2019). Changing perspectives on the internationalization of R&D and innovation by multinational enterprises: A review of the literature. *Journal of International Business Studies*, 1–42.

Phelps, N. A. (1993). Branch plant and the evolving spatial division of labour: A study of material linkage change in the Northern Region of England. *Regional Studies*, *27*(2), 87–101. doi:10.1080/00343409312331347405

Rama, R. (2009). Foreign investment innovation. A review of selected policies. *The Journal of Technology Transfer*, *33*(4), 353–363. doi:10.100710961-007-9050-2

Rama, R., & Ferguson, D. (2007). Emerging districts facing structural reform: The Madrid electronics district and the reshaping of the Spanish telecom monopoly. *Environment & Planning A*, *39*(9), 2207–2231. doi:10.1068/a38270

Santangelo, G. D. (2009). MNCs and linkages creation: Evidence from a peripheral area. *Journal of World Business*, *44*(2), 192–205. doi:10.1016/j.jwb.2008.05.009

Sanz Menéndez, L., Fernández Carro, J. R., & García, C. E. (1999). Centralidad y cohesión en las redes de colaboración empresarial en la I+D subsidiada. *Papeles de Economía*, *81*, 219–241.

Sauvant, K. P. (2009). *FDI Protectionism is on the Rise*. The World Bank. doi:10.1596/1813-9450-5052

Schmidt, T., & Sofka, W. (2009). Liability of foreignness as a barrier to knowledge spillovers: Lost in translation? *Journal of International Management*, *15*(4), 460–474. doi:10.1016/j.intman.2009.03.003

Singh, J. (2007). Asymmetry of Knowledge Spillovers between MNCs and Host Country Firms. *Journal of International Business Studies*, *38*(5), 764–786. doi:10.1057/palgrave.jibs.8400289

Srholec, M. (2009). Does foreign ownership facilitate cooperation on innovation? Firm-level evidence from the enlarged European Union. *European Journal of Development Research*, *21*(1), 47–62. doi:10.1057/ejdr.2008.9

Srholec, M. (2015). Understanding the diversity of cooperation on innovation across countries: Multi-level evidence from Europe. *Economics of Innovation and New Technology*, *24*(1-2), 159–182. doi:10.1080/10438599.2014.897864

Un, C. A., Romero-Martínez, A. M., & Montoro-Sánchez, Á. (2009). Determinants of R&D collaboration of service firms. *Service Business*, *3*(4), 373–394. doi:10.100711628-009-0065-7

Valdaliso, J. M. (2018). Accounting for the resilience of the machine-tool industry in Spain (c. 1960–2015). *Business History*, 1–26. doi:10.1080/00076791.2018.1473380

Valdaliso, J. M., Elola, A., Aranguren, M. J., & López, S. (2011). Social capital, internationalization and absorptive capacity: The electronics and ICT cluster of the Basque Country. *Entrepreneurship and Regional Development*, *23*(9-10), 707–733. doi:10.1080/08985626.2010.505268

Veugelers, R., & Cassiman, B. (2004). Foreign subsidiaries as a channel of international technology diffusion: Some direct firm level evidence from Belgium. *European Economic Review*, *48*(2), 455–476. doi:10.1016/S0014-2921(02)00327-6

Williams, C., & Ecker, B. (2011). R&D subsidiary embedment: A resource dependence perspective. *Critical Perspectives on International Business*, *7*(4), 297–325. doi:10.1108/17422041111180764

Williamson, O. E. (1985). *The economic institutions of capitalism*. The Free Press.

Wintjes, R. (2016). Systems and Modes of ICT Innovation. JRC Science for Policy Report, European Commission.

Witt, M. A. (2019). De-globalization: Theories, predictions, and opportunities for international business research. *Journal of International Business Studies*, 1–25. doi:10.105741267-019-00219-7

Zhang, S., Zhao, S., Bournakis, I., Pearce, R., & Papanastassiou, M. (2018). Subsidiary roles as determinants of subsidiary technology sourcing: Empirical evidence from China. *Economics and Politics*, 1–26.

Zouaghi, F., Sánchez, M., & García Martínez, M. (2018). Did the global financial crisis impact firms' innovation performance? The role of internal and external knowledge capabilities in high and low tech industries. *Technological Forecasting and Social Change*, *132*, 92–104. doi:10.1016/j.techfore.2018.01.011

ENDNOTES

1. OECD, "FDI qualities Toolkit: Investment for Sustainable Growth: Progress Report II", Paris, October 2018.
2. In this chapter, the term "cooperative" refers to cooperation for innovation.
3. Also called collaboration for innovation in the literature and in this chapter.
4. https://www.acea.be/statistics/tag/category/eu-production. December 2018.
5. https://www.investinspain.org/invest/es/sectores/automocion/descripcion/index.html Government of Spain, December 2018 (data for 2017).
6. https://www.afm.es/es/quienes-somos/sector-maquina-herramienta, December 2018.

APPENDIX

Table A1. Relationship between foreign ownership and local cooperation for innovation. Selected studies

Author (s)	Source of data / sample (1)	Geographical coverage	Control group	Main results
a) All sectors				
Veugelers & Cassiman (2004)	CIS 1992. 1,335 manufacturing firms	Belgium	All domestic firms	Foreign ownership has a negative effect on the probability of domestic cooperation
Dach et al. (2008)	CIS3. CIS-type survey for Norway. National samples could not be pooled	Austria, Denmark, Finland, Norway, and Sweden	All domestic firms	In Finland and Sweden, foreign ownership is positively associated to domestic cooperation. In Denmark and Norway, it is neutral. In Austria, foreign subsidiaries seem to be reluctant to engage in domestic cooperation
Srholec (2009)	CIS3. 46,000 firms in industry and market services	12 EU countries	All domestic firms	Foreign ownership is positively associated to domestic cooperation but the coefficient of its variable is very small and weakly statistically significant
Ebersberger et al. (2011)	CIS, 2004 and 2006. 130,274 observations	22 EU countries + Iceland and Norway	All domestic firms. Estimates a separate model for domestic cooperation undertaken by native multinational enterprises	Foreign ownership is negatively associated to domestic cooperation. However, in technology-leader countries, no effect can be detected
Ebersberger & Herstad (2012)	Norwegian Innovation Survey 2005 (CIS-type survey). 863 firms affiliated to a business group active in manufacturing or in knowledge-intensive services	Norway	Compares foreign subsidiaries and Norwegian multinational enterprises	Foreign ownership may cause branch plant syndrome in the host country
Arvanitis & Bolli (2013)	CIS3 for EU member states and Norway. A comparable survey for Switzerland. Manufacturing and service firms	Belgium, Germany, Portugal, Norway, and Switzerland	All domestic firms (includes group membership as a control variable)	In Norway and Portugal, foreign subsidiaries are less likely to cooperate only at the national level. In Belgium, Germany, and Switzerland, no effect of foreign ownership is detected
Holl & Rama (2014)	PITEC data. 10,209 companies active in manufacturing and services, 2005-2009	Spain	Distinguishes between unaffiliated domestic firms and domestic groups	Foreign subsidiaries tend to engage in local cooperation for innovation to a greater extent than do unaffiliated domestic firms and domestic groups
Srholec (2015)	CIS4. 28,674 firms	15 EU countries	All domestic firms	Foreign ownership tends to be negatively associated to domestic cooperation
Guimón & Salazar-Elena (2015)	PITEC data. 9,614 firms, 2005-2011	Spain	Distinguishes between unaffiliated domestic firms and domestic groups	Domestic groups and foreign multinationals are more prone to cooperate with Spanish universities than are unaffiliated domestic firms. Foreign subsidiaries do not display a higher propensity than domestic groups.

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Table A1. Continued

Author (s)	Source of data / sample (1)	Geographical coverage	Control group	Main results
Cozza & Zanfei (2016)	Italian Bureau of Statistics. 13,675 firms performing R&D, 2001-2010	Italy	Distinguishes between unaffiliated domestic firms and domestic groups. Compares foreign subsidiaries and Italian groups with international R&D	Foreign subsidiaries and domestic groups are more prone to cooperate with Italian universities than are unaffiliated domestic firms, although differences remain small. Italian groups with international R&D outperform foreign subsidiaries
García Sánchez et al. 2016	PITEC data. 1,965 manufacturing companies, 2004-2008	Spain	Domestic groups	Foreign subsidiaries tend to engage in local cooperation for innovation to a greater extent than do domestic groups. However, the advantage held by foreign subsidiaries in this respect disappears in a subsample of highly innovative companies
Cozza et al. (2018)	Italian Business R&D Survey and Bureau Van Dijk. 13,675 firms, 2001-2010.	Italy	All domestic firms. Also distinguishes between foreign and Italian MNEs	Foreign subsidiaries are less prone than domestic firms to set up domestic cooperation. They are also less prone than, specifically, Italian MNEs.
b) High-tech sectors				
Ebersberger et al. (2011)	CIS, firms engaged in high-tech manufacturing and knowledge-intensive services, 2004- 2006.	22 EU countries + Iceland and Norway	All domestic firms in these sectors. Estimates a separate model for domestic cooperation undertaken by native multinational enterprises	The effect of foreign ownership on the probability of the firm engaging in LCI tends to be either negative or not statistically significant
Binh & Linh (2013)	Case studies. Three major foreign MNEs and three Vietnamese suppliers pertaining to electronics industries	Vietnam	---	Foreign firms collaborate for innovation with research centres, but transfers of technology to local firms are limited
Guimón & Salazar-Elena (2015)	PITEC data for 2005-2011. Firms active in: computer programming and consultancy; and in manufacture of computers, electronics, and optical products.	Spain	Distinguishes between unaffiliated firms and domestic groups	Foreign subsidiaries are more likely than UDFs to cooperate for innovation with local universities, but not necessarily more than DGs
Chi & Sun (2018)	189 firms active in electronics, electric power, and manufacturing equipment	China	Domestic firms	The effect of foreign ownership on the probability that a firm will obtain a patent from its cooperative activities is not statistically significant
Holl & Rama (2019)	PITEC data. 9,790 firms engaged in TIC during 2004-2013	Spain	Unaffiliated domestic firms, domestic groups with and without international cooperation for innovation	Foreign subsidiaries show fewer propensities to cooperate locally for innovation than do domestic groups with international cooperation for innovation. However, they are more likely to cooperate than UDFs and other domestic groups

Table A2. Description of variables

Name of variable	Description of variables
LocCoopInn	**Local cooperation for innovation** (dependent variable) takes value 1 if the firm has cooperated for innovation with local external partners in the two previous years
Fsub	**Foreign subsidiary** takes value 1 if the firm belongs to a foreign MNE
DomG	**Domestic business group** takes value 1 if the firm belongs to a business group with headquarters in Spain
i_ownfund	**Own funds** takes value 1 if the company is more able than average to fund its innovation projects with its own financial resources
i_RDpers	**R&D personnel** takes value 1 if the firm hires more R&D employees than average
i__newent	**New to the enterprise** takes value 1 if the firm's share of improved products in turnover is above average
i_newmar	**New to the market** takes value 1 if the firm's share of radically new products in turnover is above average
i__interinfo	**Internal sources of information** takes value 1 if the firm values its internal sources for innovation above average
i_intRDexp	**Internal R&D expenditures** takes value 1 if the firm invests more than average in internal R&D
i_extRDexp	**External R&D expenditure** takes value 1 if the firm invests more than average in external R&D
i_otherInnexp	**Other innovation expenditures** takes value 1 if the firm invests more than average in innovation expenditures other than R&D
i__knowobst	**Knowledge obstacles** takes value 1 if the firm encounters greater-than-average knowledge obstacles to innovation
i_econobst	**Economic obstacles** takes value 1 if the firm encounters greater-than-average economic obstacles to innovation
i_marketobst	**Market obstacles** takes value 1 if the firm encounters greater-than-average market obstacles to innovation
i_competobst	**Competition obstacles** takes value 1 if the firm encounters greater-than-average competition obstacles to innovation
Crisis	2008-2014 signals the in-crisis period
i_size	**Size** takes value 1 if the firm is larger than average in terms of number of employees
l_size	**Logarithm** of the number of employees
Mdoue	**European Union market** takes value 1 if the firm exports goods or services to the EU
previous LocCoop	**Previous local cooperation** takes value 1 if the firm reported local cooperation for innovation in the two previous years

Note: "i_" before the name of the variable indicates that the focal firm is compared to the average firm in its two-digit sector.

Table A3. Correlation matrix

	LocCoopInn	previousLocCoop	crisis	i_intRDexp	i_extRDexp	i_otherRDexp	i_RDpers	i_fonp~c	l_size	i_size	i_newmar	i_newenter	i_interinfo	Mdoue	i_knowobst	i_econobst	i_competobst	i_marketobst	Fsub
LocCoopInn	1.0000																		
previousLocCoop	0.5160	1.0000																	
crisis	0.0448	0.1003	1.0000																
i_intRDexp	-0.0771	-0.0621	-0.0376	1.0000															
i_extRDexp	0.1151	0.0924	-0.0251	-0.3075	1.0000														
i_otherRDexp	0.0418	0.0235	-0.0013	-0.3960	-0.0853	1.0000													
i_RDpers	0.1780	0.1720	-0.0138	0.1029	0.0059	-0.0503	1.0000												
i_fonprop_pc	-0.0041	-0.0086	-0.0379	0.3763	-0.0416	-0.1365	0.0836	1.0000											
l_size	0.2357	0.2265	0.0446	-0.0646	0.0323	0.1581	0.3820	0.0376	1.0000										
i_size	0.1815	0.1802	0.0420	-0.0795	0.0319	0.1319	0.3503	-0.0131	0.6419	1.0000									
i_newmar	0.0790	0.0695	-0.0069	0.0423	0.0177	-0.0527	0.0833	0.0704	-0.0271	-0.0207	1.0000								
i_newenter	0.0613	0.0388	-0.0078	0.0145	0.0211	0.0073	0.0470	0.0375	-0.0152	-0.0010	0.0200	1.0000							
i_interinfo	0.0747	0.0529	0.0006	0.0970	0.0395	-0.0104	0.1262	0.1505	0.0490	0.0176	0.0827	0.0490	1.0000						
mdoue	0.1128	0.1123	0.1012	0.0537	0.0192	-0.0005	0.1825	0.0990	0.3005	0.1743	0.0604	0.0195	0.1012	1.0000					
i_knowobst	0.0183	-0.0036	0.1858	-0.0017	-0.0153	-0.0019	-0.0248	-0.0374	-0.0568	-0.0693	-0.0154	0.0207	-0.0060	-0.0919	1.0000				
i_econobst	0.0088	0.0148	0.0378	0.0315	0.0167	-0.0426	-0.0426	-0.0008	-0.1904	-0.1334	0.0044	0.0308	0.0294	-0.0295	0.2145	1.0000			
i_competobst	0.0229	0.0081	0.0404	0.0069	0.0274	-0.0177	-0.0053	-0.0309	-0.1120	-0.0981	-0.0269	0.0349	0.0004	-0.0106	0.2599	0.3055	1.0000		
i_merketobst	-0.0571	-0.0520	0.0257	-0.0713	-0.0301	0.0396	-0.0979	-0.0766	-0.0275	-0.0064	-0.0548	-0.0092	-0.1142	-0.0679	0.1672	0.0477	0.1078	1.0000	
Fsub	0.1048	0.0921	0.0195	-0.0345	-0.0045	0.0492	0.1225	-0.0100	0.3075	0.3171	-0.0060	-0.0200	0.0306	0.1780	-0.0643	-0.1529	-0.0956	-0.0179	1.0000

Chapter 11

Business Process Re-Engineering and Its Challenges in India:

A Case Study of Indian Traditional Industries

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ABSTRACT

The global business environment has become more mindful of present-day cookware risks. Such risks as nickel and chromium draining from hardened steel pots have resulted in a rebound of nourishments of conventional materials like copper, iron, stone, and dirt into Indian kitchens. Changing business perspectives and consumer needs have motivated this trend resulting in developing interest in brands representing considerable authority in legacy cookware. This chapter reviews the applicability of business process reengineering (BPR) and its challenges in India, focusing on traditional industries. The study adopts a multi-criteria decision-making (MCDM) to identify and confirm the top difficulties and variables influencing BPR execution in conventional efficient earth, copper utensils. The study found out that, for BPR to succeed, it is imperative to have a sufficient IT foundation and lucidness in the continuous procedures and practices. The chapter further establishes how various BPR elements can be organized to achieve significant efficiency, cycle times, quality, and cost reduction.

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INTRODUCTION

Companies have been facing most unpredictable times in recent times than ever before. With the expenses and the dangers of worldwide activities moving, organizations need to choose where to contend along the worthiest chain, think about new help contributions, also, reevaluate their geographic impression. Speed to market is turning into a significant milestone, and numerous organizations are limiting stockpile chains for better coordination. Instead of keeping providers at arm's length, organizations can profit by more community-oriented associations with those at the center of the business. The patterns we recognize may support progressed economies, given their qualities in development and benefits, just as their profoundly gifted labor forces. Indeed, even as a strategy creator's center around the exchange openings of things to come, incomplete business stays from the past influx of globalization. Governments worldwide should accomplish more to help laborers and nearby networks get up to speed in worldwide industry shifts and innovative change. By entirely dealing with the past disengagements, they might have the option to make the next part of globalization more comprehensive.

BACKGROUND

Occupied with selling kitchen utensils, the business house can zero in on selling all or a blend of these utensils: full plates, quarter plate, serving spoons, bowls, cups, soup bowls, holders, cookers, microwave-safe dishes, rice plates, containers, skillet, grater, peelers, bushels, glasses, spoons, blade sets, forks, blending bowls, spatulas, sifters, supper products, cooking pots, serving plate, flame broils, hot skillet, and so forth. These utensils are accessible in an assortment of materials like treating steel, melamine, bone china, plastic, wood, silicone, anodized aluminum, and so forth. To pass judgment on the benefit of selling utensils, it is vital to do an opposition investigation. The degree of rivalry and winning in the market will be a significant factor to consider before going into the seed business. The interest in the item, the pattern of interest, and variances, if any popular, are significant variables to be considered in deciding the business's productivity. If there should arise an occurrence of selling kitchen utensils, the interest is required to be high and persistent all through the year. The profitability of any business relies on two things-speculation required and anticipated returns. Lesser speculation and lesser speculation and more significant yields help in producing higher profitability. Due to the appeal related to kitchen utensils, it is viewed as a beneficial business option.

Since the interest in kitchen utensils is gigantic on the lookout, the fruition levels are also high as an ever increasing number of individuals are going into selling kitchen utensils. Neck to neck rivalry has influenced the productivity occupied with offering kitchen utensils generally. So modified and designed material is essential in utensil design and material. Consumers prefer traditionally designed and light material with medical advantage. There are some deductively demonstrated medical advantages of Copper, yet the pure metal turns acidic if wet. The most crucial reason why numerous Indian enterprises are engaged with Copper makes serve ware, similar to platters, tumblers, flagons, and mugs. The benefit of putting away water in copper pots eliminates microscopic organisms. One of the prime supporters, Sudakshina Banerjee says, "Copper keeps up solid skin, and even influences the cerebrum and heart; it also mends wounds quicker. "Some metal specialists are working to establish the legacy of Copper metal since 2014. This social endeavor works with craftsman groups in Maharashtra, Konkan, and Karnataka. Their affirmed, lead-free Kansa range is famous, as well. A blend of tin and Copper, Kansa does not discolor with time, and tin is known to improve cerebrum movement. They likewise have assortments in metal and silver.

For example, cooking in mud diminishes the corrosiveness of food, regardless of whether it requires some investment than non-stick pans. Food cooked and served in conventional prams (cooking vessels) isn't just scrumptious yet also wealthy in supplements. "They help hold the nutrition of the food for a longer period. Nowadays people like customary utensils with correct artisans and must carries nutritional content of the food. They focus on beauty with health and safety issues. The utensils must have a nonpoisonous effect on food.

Even however there is developing mindfulness about conventional cookware and serve ware, there is a need to energize the craftsmen who make them. "We have to have topographical sign tag for experts as well, to keep alive their manifestations." The Slow Movement follows adventures that change what we look like at wellbeing, magnificence, and style. Still, Copper, dirt, and composite utensils are not popular among Indian clients. Copper, brass utensils are substantial and free their sparkle without the appropriate care. Once imprint mark is their additionally not look good. Although it tends to be further adjusted or mend yet, it is also a very cumber total process. Clay is the conventional pot with many advantages but still faces trouble in handling because of its weak structure and brittle nature. So this Indian customary business needs a parcel of help through Business process designing and re-engineering.

The Business Process Re-engineering Implementation process begins from zero to reproduce the entire process with less cycle time. BPR is never really better yield, quality, speed, and cost-productivity in a business' item improvement overhauling process. The usage is done in an expository and prescriptive way to assess a central business process's elective casings. For a Business Process Re-engineering to succeed, it is critical to have a satisfactory IT framework and clearness on the continuous procedure and practices. In this section, the top difficulties and components influencing business process re-engineering in customary organizations like clay, copper utensils are contemplated and most significant challenges or elements are prioritized.

LITERATURE REVIEW

A business process can be identified as the type of commodity that flows through the system (Srinivasan, 2011; Barnes, 2001a; Barnes, 2001b). BPR focuses on the whole process, starting from the conceptual product stage to the final product design (Srinivasan, 2011; Bhaskar, 2016). Information Technology plays a central role in BPR by achieving breakthrough performances in organizational systems, but it can be easily misplaced (Bhaskar, 2014). IT is part of the re-engineering effort (Hanif, 2014; Goksoy et al., 2012; Thyagarajan & Khatibi, 2004), an essential enabler (Goksoy et al., 2012) since it permits companies to re-engineer business processes. The entire business system consists of processes. Processes are invisible and unmanaged because people think about the individual departments, not about the process with which they are involved (Hammer & Champy, 2009; Aslam et al., 2005; Aslam & Shami, 2002). In business process re-engineering lies that propensity that organizations can perform better, satisfy the customers and the employees, and enhance the quality of their products (Nadeem and Ahmad, 2016). In Nigeria, Ogbo et al. (2015) looked at business process re-engineering and commercial banks' performance in north-central Nigeria.

According to Farmer (1993), re-engineering operations help customer satisfaction, increased flexibility, improved competitiveness, and increased productivity. This will bring new prospects for success through a significant change in operations (Abazid, 2017); Nouban & Abazid, 2017). Companies are increasingly shifting their attention to internal business processes' performance to improve corporate performance (Sujová et al., 2016). Evans (2018) points out that a favorable financial result in the profit indicator may not necessarily mean operational efficiency evaluated by ratio indicators. Financial performance development analysis can be made based on financial ratio indicators and enable the prediction of future performance (KiseΎαkovα et al., 2018). Most authors recommend the ratio indicators for profitability analysis, activity indicators, indebtedness indicators, cash flow indicators, market value indicators of the enterprise, and the economic value-added (EVA) indicator. Marcineková and Sujová (2015) indicated that it must have inputs and outputs, logical continuity, added value, an internal or external customer, a process owner, and must be repeatable and measurable. Sujovα and Θierna (2018) agreed that process-driven organizations are customer-centered and, therefore, they create higher value for the customer, focus on process management through analyses and metrics, use concepts, methods, and approaches to improve processes as well as optimize and model them to make more radical changes and improve their performance. This in turn improves the relationship with customers and ultimately, customer loyalty (Makasi & Saruchera, 2014).

It has been reported in earlier studies that Interpretive Structural Modeling (ISM) enables the management of interrelations among two or more elements/issues (Raj et al., 2008). For an adequate description of a hierarchy among the variables, elements, or influencers, ISM provides a practical framework for any project under concern (Sage, 1977; Warfield, 1974). The ISM has been found as a useful tool in thinking logically and approaching complex-issues carefully, and communicating the results of thinking to others. Further, it is more flexible than other conventional quantitative-modeling approaches requiring the measurement of variables on ratio-scales. The ISM approach can be used individually, although it has been regarded as a group learning-process (Raj et al., 2008). A wide range of fields has found the suitability in ISM application that includes: analyzing the interactions between barriers in energy saving (Wang et al., 2008), analyzing the drivers and barriers that influence in implementing green supply chain management (Mathiyazhagan et al., 2013), and analyzing the interactions between barriers in smart grid-technology (Luthra et al., 2014). Moreover, several inter-related factors are said to be associated with any complex issue or problem under consideration, thus for a proper depiction of the situation, the direct as well as indirect relationships among those factors will be more appropriate as compared to individual factors (Mishra and Satapathy, 2020; Satapathy, 2014). Therefore, the ISM approach has been used to analyze the identified risk factors further.

RESEARCH METHODOLOGY

To establish the challenges of BPR implementation, the authors interviewed academic experts, businesspeople, entrepreneurs, and finance managers in India's traditional utensils business. A total of 50 respondents were 50 persons were contacted in this regard.

RESULTS AND DISCUSSION

From the survey, the authors found that the main challenges of Business process Re-Engineering in Utensil industries in India are as follows:

1. Lack of BPR knowledge
2. Wrong Direction
3. Unsuited Team Formulation
4. Insufficient And Incorrect Placement Of Resources
5. Unsound analysis and lack of support
6. Lack of proper supply chain management
7. Lack of research and consumer survey
8. Lack of IT implementation makes it impossible
9. Fewer competitors in the same business
10. BPR unable to solve technical problems due to high cost
11. Limited focus on sustainability

Table.1. Percentage of challenges of BPR implementation

Sl. No	Challenges	Percentage
1	Lack of BPR knowledge	0.78
2	Wrong Direction	0.70
3	Unsuited Team Formulation	0.65
4	Insufficient And Incorrect Placement Of Resources	0.54
5	Unsound analysis and lack of support	0.47
6	Lack of proper supply chain management	0.45
7	Lack of research and consumer survey	0.30
8	Lack of IT implementation makes it impossible	0.30
9	Fewer competitors in the same business	0.25
10	BPR unable to solve the technical problem due to the high cost	0.21
11	Limited focus on Sustainability	0.08

Lack of proper knowledge was regarded as the top challenge among all challenges, followed by wrong direction and irregularity in implementation, and unsuited team formulation. Limited focus on sustainability in business was considered the least challenge, followed by the inability to solve the technical BPR problems due to the high cost.

ISM was implemented to find interrelationships between the challenges of BPR implementation in Utensil traditional business. Results are shown in Table 2.

For the development of SSIM, as shown in Table 3, the experts' views were used to define the risk factors' contextual relationships. The four symbols (V, A, X, O) used for indicating the direction of relationships were based on dependence between two-factors (i and j). The SSIM was drawn by considering the following four possibilities: a) if factor i helped to achieve factor j, then the symbol used was 'V'; if factor j helped to achieve factor i, then the symbol used was 'A'; if both the factors i and j helped to achieve each-other, then the symbol used was 'X'; and for no relation between the factors i and j, the symbol used was 'O', respectively (Bian et al., 2020; Latifi et al., 2020).

Table 2. The selection of Challenges for BPR in Utensil Business factors to generate the ISM model

Sl. No.	Challenges	Symbols
1	Lack of BPR knowledge	RF1
2	Wrong Direction	RF2
3	Unsuited Team Formulation	RF3
4	Insufficient And Incorrect Placement Of Resources	RF4
5	Unsound analysis and lack of support	RF5
6	Lack of proper supply chain management	RF6
7	Lack of research and consumer survey	RF7
8	Lack of IT implementation makes it impossible	RF8
9	Fewer competitors in the same business	RF9
10	BPR unable to solve the technical problem due to high cost	RF10
11	Limited focus on Sustainability	RF11

Table 3. Development of SSIM

Risk Factors	RF11	RF10	RF9	RF8	RF7	RF6	RF5	RF4	RF3	RF2	RF1
RF1	O	O	O	O	O	O	A	V	O	O	
RF2	X	V	V	O	X	O	V	A	O		
RF3	O	V	V	V	O	V	V	O			
RF4	O	X	O	O	A	V	X				
RF5	O	O	A	X	A	V					
RF6	A	A	A	X	A						
RF7	V	V	O	V							
RF8	A	A	X								
RF9	X	A									
RF10	O										
RF11											

Further, the SSIM was converted into a binary-matrix called "initial reachability matrix or Initial-RM" as shown in Table 4, which was obtained by replacing "V, A, X and O" with the substitution of "0 and 1" following the VAXO-rules, such as: a) For the entry of 'V' in SSIM, the value of the element (i, j) was entered as '1', and '0' for (j, i) in Initial-RM; b) For the entry of 'A' in SSIM, the value of the element (i, j) was entered as '0', and '1' for (j, i); c) For the entry of 'X' in SSIM, the value of the element (i, j) was entered as '1', and also '1' for (j, i); and d) For the entry of 'O' in SSIM, the value of the element (i, j) was entered as '0', and also '0' for (j, i) in Initial-RM; respectively (Bian et al., 2020; Latifi et al., 2020; Shen et al., 2016).

Table 4. Initial-RM

Risk Factors	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	RF10	RF11
RF1	1	0	0	1	0	0	0	0	0	0	0
RF2	0	1	0	0	1	0	1	0	1	1	1
RF3	0	0	1	0	1	1	0	1	1	1	0
RF4	0	1	0	1	1	1	0	0	0	1	0
RF5	1	0	0	1	1	1	0	1	0	0	0
RF6	0	0	0	0	0	1	0	1	0	0	0
RF7	0	1	0	1	1	1	1	1	0	1	1
RF8	0	0	0	0	1	1	0	1	1	0	0
RF9	0	0	0	0	1	1	0	1	1	0	1
RF10	0	0	0	1	0	1	0	1	1	1	0
RF11	0	1	0	0	0	1	0	1	1	0	1

The Final-RM with transitivity-relationships showing each risk factor's driving-power and dependence was as shown in Table 5. For a particular factor, the driving-power was obtained by considering the total number of factors that it helped to achieve and that particular factor. The dependence was obtained by considering the total number of factors that it helped to achieve. Further, from the Final-RM, the "reachability in addition to antecedent set" for each factor was found.

Table 5. Final-RM with transitivity-relationships

Risk Factors	RF1	RF2	RF3	RF4	RF5	RF6	RF7	RF8	RF9	RF10	RF11	Driving-power
RF1	1	0	0	1	0	0	0	0	0	0	0	2
RF2	0	1	0	1*	1	0	1*	0	1	1	1*	7
RF3	0	0	1	0	1	1	0	1	1	1	0	6
RF4	0	1	0	1	1*	1	0	0	0	1*	0	5
RF5	1	0	0	1*	1	1	0	1	0	0	0	5
RF6	0	0	0	0	0	1	0	1	0	0	0	2
RF7	0	1*	0	1	1	1	1	1	0	1	1	8
RF8	0	0	0	0	1	1	0	1	1	0	0	4
RF9	0	0	0	0	1	1	0	1	1	0	1	5
RF10	0	0	0	1*	0	1	0	1	1	1	0	5
RF11	0	1*	0	0	0	1	0	1	1	0	1	5
Dependence	2	4	1	6	7	9	2	8	6	5	4	

*Transitivity-relationships

The reach-ability set for challenge comprised the factor itself and other factors set that caused an impact. The antecedent set comprised of the primary factor and other factors that helped in achieving the primary factor. Then, the intersection set was obtained, and the factors with similar reach-ability and intersection set were given at the top-level in the ISM hierarchy. After that, repetition of the same process or iteration-process was done for finding the subsequent levels for other factors, which was continued until the completion of level-partitioning (Table 6, Table 7, Table 8, Table 9, Table 10, Table 11, and Table 12, respectively). The obtained levels helped build the digraph (Figure 2) and the final ISM model, as shown in Figure 1.

ISM process transforms unclear, poorly articulated mental models of systems into visible and well-defined models. These models help to find the key factor related to the problem or issue. After identification of key factor or element, the strategy may be developed for dealing issue

Table 6. Iteration-A

Risk Factors	Reachability set	Antecedent set	Intersection set	Level
RF1	1, 4	1, 5	1	
RF2	2, 4, 5, 7, 9, 10, 11	2, 4, 7, 11	2, 4, 7, 11	
RF3	3, 5, 6, 8, 9, 10	3	3	
RF4	2, 4, 5, 6, 10	1, 2, 4, 5, 7, 10	2, 4, 5, 10	
RF5	1, 4, 5, 6, 8	2, 3, 4, 5, 7, 8, 9	4, 5, 8	
RF6	6, 8	3, 4, 5, 6, 7, 8, 9, 10, 11	6, 8	I
RF7	2, 4, 5, 6, 7, 8, 10, 11	2, 7	2, 7	
RF8	5, 6, 8, 9	3, 5, 6, 7, 8, 9, 10, 11	5, 6, 8, 9	I
RF9	5, 6, 8, 9, 11	2, 3, 8, 9, 10, 11	8, 9, 11	
RF10	4, 6, 8, 9, 10	2, 3, 4, 7, 10	4, 10	
RF11	2, 6, 8, 9, 11	2, 7, 9, 11	2, 9, 11	

Table 7. Iteration-B

Risk Factors	Reachability set	Antecedent set	Intersection set	Level
RF1	1, 4	1, 5	1	
RF2	2, 4, 5, 7, 9, 10, 11	2, 4, 7, 11	2, 4, 7, 11	
RF3	3, 5, 9, 10	3	3	
RF4	2, 4, 5, 10	1, 2, 4, 5, 7, 10	2, 4, 5, 10	II
RF5	1, 4, 5	2, 3, 4, 5, 7, 9	4, 5	
RF7	2, 4, 5, 7, 10, 11	2, 7	2, 7	
RF9	5, 9, 11	2, 3, 9, 10, 11	9, 11	
RF10	4, 9, 10	2, 3, 4, 7, 10	4, 10	
RF11	2, 9, 11	2, 7, 9, 11	2, 9, 11	II

Table 8. Iteration-C

Risk Factors	Reachability set	Antecedent set	Intersection set	Level
RF1	1	1, 5	1	III
RF2	2, 5, 7, 9, 10	2, 7	2, 7	
RF3	3, 5, 9, 10	3	3	
RF5	1, 5	2, 3, 5, 7, 9	5	
RF7	2, 5, 7, 10	2, 7	2, 7	
RF9	5, 9	2, 3, 9, 10	9	
RF10	9, 10	2, 3, 7, 10	10	

Table 9. Iteration-D

Risk Factors	Reachability set	Antecedent set	Intersection set	Level
RF2	2, 5, 7, 9, 10	2, 7	2, 7	
RF3	3, 5, 9, 10	3	3	
RF5	5	2, 3, 5, 7, 9	5	IV
RF7	2, 5, 7, 10	2, 7	2, 7	
RF9	5, 9	2, 3, 9, 10	9	
RF10	9, 10	2, 3, 7, 10	10	

Table 10. Iteration-E

Risk Factors	Reachability set	Antecedent set	Intersection set	Level
RF2	2, 7, 9, 10	2, 7	2, 7	
RF3	3, 9, 10	3	3	
RF7	2, 7, 10	2, 7	2, 7	
RF9	9	2, 3, 9, 10	9	V
RF10	9, 10	2, 3, 7, 10	10	

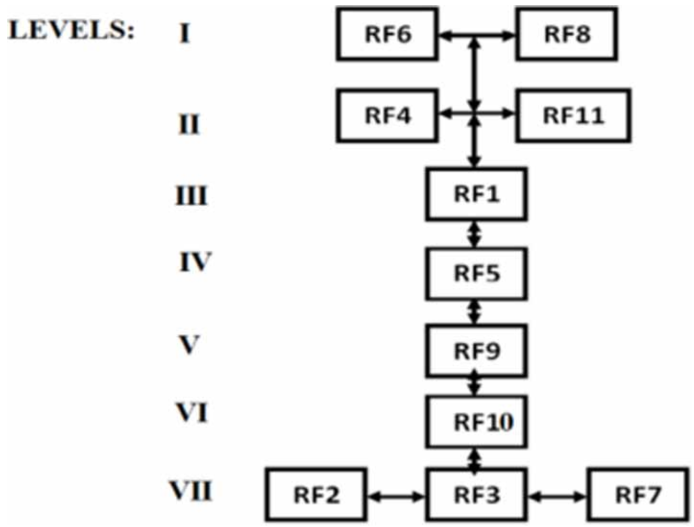
Table 11. Iteration-F

Risk Factors	Reachability set	Antecedent set	Intersection set	Level
RF2	2, 7, 10	2, 7	2, 7	
RF3	3, 10	3	3	
RF7	2, 7, 10	2, 7	2, 7	
RF10	10	2, 3, 7, 10	10	VI

Table 12. Iteration-G

Risk Factors	Reachability set	Antecedent set	Intersection set	Level
RF2	2, 7	2, 7	2, 7	VII
RF3	3	3	3	VII
RF7	2, 7	2, 7	2, 7	VII

Figure 1. ISM model for parameters (Attri et al. (2013)

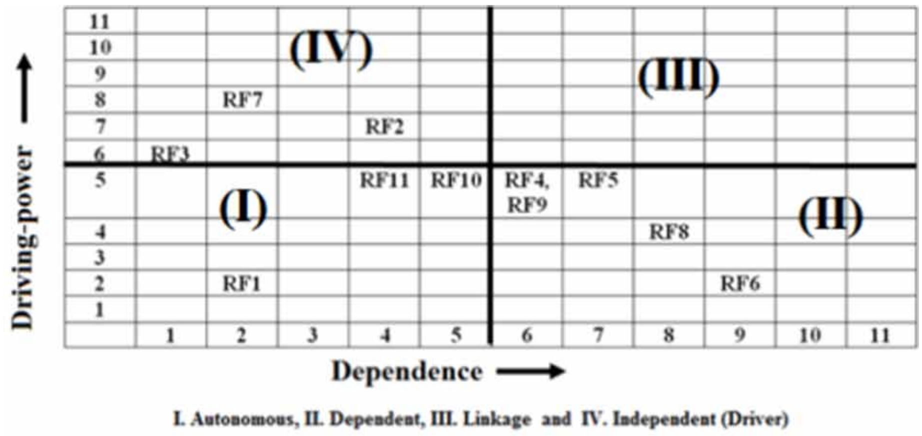


MICMAC Analysis

Besides, a "Matrix Impact Cross-Reference Multiplication Analysis (MICMAC)" was done to identify and cluster the key risk factors. In the year 1973, MICMAC was developed by Duperrin and Godet (Wang et al., 2008), which was used in defining and analyzing the dependency and driving-force of variables (Mandal and Deshmukh, 1994). In MICMAC analysis, the factors have been classified into four categories, such as "Autonomous, Linkage, Dependent, and Driving factors" (Mishra & Satapathy, 2020; Ravi and Shankar, 2005). The four-categories of MICMAC analysis in this study (Figure 2) included the following:

I. Autonomous factors*:* These indicated a weak driving-power and dependence and were disconnected from the system. This included the most critical challenges such as RF1 (Lack of proper Knowledge), RF10 (BPR unable to solve technical problems due to high cost), and RF11 (Sustainability - environment and social) issues, respectively.
II. Dependent factors*:* These indicated a weaker driving-power, but with stronger dependence. Any action on these factors can affect others with feedback-effect on themselves. This included the risk factors, such as: RF4 (Insufficient And Incorrect Placement Of Resources), RF5 (Unsound analysis and lack of support), RF6 (Lack of proper supply chain management), RF8 (Lack of IT implementation makes it impossible), and RF9 (Fewer competitors in the same business), respectively.
III. Linkage factors*:* These indicated a strong driving-power as well as dependence and were unstable. Any action on these factors can affect others with feedback-effect on themselves. In this study, no challenges were included in this cluster.
IV. Driving factors*:* These indicated a stronger driving-power, but with weaker dependence. This included the risk factors, such as: RF2 (Wrong Direction and Irregularity in Implementation), RF3 (Unsuited Team Formulation), and RF7 (Lack of research and consumer survey), respectively.

Figure 2. Diagraph of MICMAC analysis



CONCLUSION

BPR usage requires a top-down order administration style, proper IT facility in the infrastructure, and managerial technique, changing the business process from the initial stage. Re-engineering powers changes in the executives' style. It powers administrators to reconsider what they do, yet additionally what their identity is. The executives must change how they think, compose, plan, send, move, and prize execution. They should figure out how to sort out work in a comprehensive, coordinated way. They should make a domain where generalists are supplanted with masters and where distraction with interior exercises is moved to a plan concentrated on clients. Implementing BPR will improve the global business profit and improve the business' financial and technical aspects. For Proper Business Process Reengineering can be a game-changer for any organization. Business process re-engineering may perform wonders on a failing or stagnating business, increase profits and drive development if properly managed. Business process re-engineering is recreating a core business process to improve product output, quality, or reducing costs. Typically, it involves analyzing company workflows, finding sub-part or inefficient processes, and figuring out ways to get rid of them or change them. Particularly in traditional business, it will reduce cost by taking care of quality, reducing operational cost, and improving customer satisfaction. Business Process Re-engineering is one of the few concepts, which have saved many companies from bankruptcy. This chapter aims to present the importance of that concept and show how important it is for organizations to implement and modify selected processes with awareness. In addition, the article covers the benefits. It points out problems and difficulties that may arise in the implementation process because BPR is a concept created only for organizations that have thoroughly analyzed the application of desired changes.

Re-engineering is undoubtedly a complex concept that requires humility and a critical look at the company by classifying its flaws and imperfections. Only through the continued commitment of management makes it possible to eliminate passivity, open to changes, and create an atmosphere of mutual trust. Flattening of organizational structure, decentralization, the introduction of teamwork, and giving individuals the right to make independent decisions affect good communication with the company's crew, which should always be informed about the origins, objectives, and progress of the project.

The biggest challenge is to plan all BPR processes and change the people involved in the transformation. So more research is required in BPR with the integration of TQM. More research is required to design automation and information technology (IT) and AI for improving BPR in traditional business. More research and survey is essential to find improvement in business and Organization after BPR implementation.

REFERENCES

Abazid, M. (2017). The quality control implementation in the construction projects in Saudi Arabia. Saudi Arabia: Near East University.

Aslam, M. F., Hassan, T., & Shami, T. A. (2005). Re-engineering of systems operation; A solution to the challenges in the deregulated market environment-I. *Proceedings of the 5th WSEAS Int. Conf. on Power Systems and Electromagnetic Compatibility*, 460-465.

Barnes, D. (2001). Research methods for the empirical investigation of the process of formation of operations strategy. *International Journal of Operations & Production Management*, *21*(8), 1076–1095. doi:10.1108/EUM0000000005586

Barnes, D. (Ed.). (2001). Understanding business: processes. Business & Economics, 119.

Bhaskar, H. L. (2014). *BPR as a quality improvement tool, Handbook of Management, Technology and Social Sciences*. SEMS Publication.

Bhaskar, H. L., & Singh, R. P. (2014). Business process re-engineering: A recent review. *Global Journal of Business Management*, *8*(2), 24–51.

Goksoy, A., Ozsoy, B., & Vayvay, O. (2012). Business process re-engineering: Strategic tool for managing organizational change an application in a multinational company. *International Journal of Business and Management*, *7*(2), 89–112. doi:10.5539/ijbm.v7n2p89

Habib, M. N., & Shah, A. (2013). Business process re-engineering: Literature review of approaches and applications. *Proceedings of 3rd Asia-Pacific Business Research Conference*, 1-25.

Hammer, M., & Champy, J. (2009). *Re-engineering the Corporation: Manifesto for Business Revolution.* Zondervan. Available at https://books.google.co.in/books?isbn=0061808644

Hanif, M., Khan, Y. S., & Zaheer, A. (2014). Impact of organizational resistance to change on BPR implementation: A case of state bank of Pakistan. *European Journal of Business and Management*, *6*(4), 186–196.

Luthra, S., Kumar, S., Kharb, R., Ansari, M. F., & Shimm, S. L. (2014). Adoption of smart grid technologies: An analysis of interactions among barriers. *Renewable & Sustainable Energy Reviews*, *33*, 554–565. doi:10.1016/j.rser.2014.02.030

Makasi, A., & Saruchera, F. (2014). The Impact of Operational Customer Relationship Management on Customer Loyalty. *Mediterranean Journal of Social Sciences*, *5*(23), 291–291. doi:10.5901/mjss.2014.v5n23p291

Mandal, A., & Deshmukh, S. G. (1994). Vendor selection using interpretive structural modeling (ISM). *International Journal of Operations & Production Management*, *14*(6), 52–59. doi:10.1108/01443579410062086

Mathiyazhagan, K., Govindan, K., NoorulHaq, A., & Geng, Y. (2013). An ISM approach for the barrier analysis in implementing green supply chain management. *Journal of Cleaner Production*, *47*, 283–297. doi:10.1016/j.jclepro.2012.10.042

Mishra, D., & Satapathy, S. (2020). An Integrated SWARA, QFD and ISM approach for Agricultural injuries in India. *International Journal of Decision Support System Technology*, *12*(2), 1–24. doi:10.4018/IJDSST.2020040101

Nadeem, M., & Ahmad, R. (2016). Impact of business process re-engineering on the performance of banks in Pakistan. *Business and Economics Journal*, *7*(1), 1–3.

Nouban, F., & Abazid, M. (2017). An overview of total quality management in construction engineering. *Academic Research International*, *8*(4), 68–74.

Ogbo, A. I., Attah, E. Y., Ewurum, U. J. F., & Ugbam, C. O. (2015). Business process re-engineering and performance of commercial banks in North Central Nigeria. *International Journal of Contemporary Applied Sciences*, *2*(10), 1–13.

Raj, T., Shankar, R., & Suhaib, M. (2008). An ISM approach for modeling the enablers of flexible manufacturing system: The case for India. *International Journal of Production Research*, *46*(24), 6883–6912. doi:10.1080/00207540701429926

Sage, A. (1977). Interpretive structural modeling: Methodology for large-scale systems. New York: McGraw-Hill.

Satapathy, S. (2014). ANN, QFD and ISM approach for framing electricity utility service in India for consumer satisfaction. *International Journal of Services and Operations Management*, *18*(4), 404–428. doi:10.1504/IJSOM.2014.063243

Srinivasan, R. (2011). Business process re-engineering. New Delhi: Tata McGraw-Hill Education Pvt. Ltd.

Thyagarajan, V., & Khatibi, A. (2004). BPR-A tool for managing the change. *Journal of Human Ecology (Delhi, India)*, *15*(1), 57–61. doi:10.1080/09709274.2004.11905667

Wang, G. H., Wang, Y., & Zhao, T. (2008). Analysis of interactions among the barriers to energy saving in China. *Energy Policy*, *36*(6), 1879–1889. doi:10.1016/j.enpol.2008.02.006

Warfield, J. W. (1974). Developing interconnected matrices in structural modelling. *IEEE Transcript on Systems, Men and Cybernetics*, *4*, 51–81.

ADDITIONAL READING

Berg, M., Mrrewijk, Ch., & Tamminen, S. (2018). Trade, productivity and profitability. On profit levels and profit margins. *World Economy*, *41*(1), 52–64.

Evans, O. (2018). Improved financial performance without improved operational efficiency: The case of Nigerian firms. *Forum Scientiae Oeconomia*, *6*(3), 25–39.

Kiseľáková, D., Šofranková, B., Čabinová, V., & Šoltésová, J. (2018). Analysis of enterprise performance and competitiveness to streamline managerial decisions. *Polish Journal of Management Studies*, *17*(2), 101–111. doi:10.17512/pjms.2018.17.2.09

Marcinekova, K., & Sujova, A. (2015). The influence of the process control level on the enterprises' ROE. *Procedia Economics and Finance*, *34*, 290–295. doi:10.1016/S2212-5671(15)01632-9

Sujová, A., Simanová, Ľ., & Marcineková, K. (2016). Sustainable Process Performance by Application of Six Sigma Concepts: The Research Study of Two Industrial Cases. *Sustainability*, *8*(3), 260. doi:10.3390u8030260

Sujová, E., & Čierna, H. (2018). Optimization and improvement of test processes on a production line. *Management Systems in Production Engineering*, *26*(2), 88–92. doi:10.2478/mspe-2018-0014

KEY TERMS AND DEFINITIONS

Business Process Re-Engineering: A program will identify the areas of strategy, processes, controls, systems, and visibility to re-engineer, plan and streamline a company's business transformation, keeping in mind their growth, vision, and strategic goals.

Interpretive Structural Modeling (ISM): Is a process that transforms unclear and poorly articulated mental models of systems into visible, well-defined models useful for many purposes.

Chapter 12
Building Blocks of the Industry and Strategizing

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ABSTRACT

Industry features are considered by Porter, Schmalensee, and many other scholars as the determinants of effective strategy formulation and implementation. While industries are widely different from each other, some common features shape all existing and future industries. This chapter aims to identify these common building blocks of industries and their possible effects on strategizing for the future in a fast transitioning business world. The chapter employs a systematic literature review from the top related journals with at least one of the nine keywords about the industry. The chapter reviews 47 factors or characteristics that form every industry. These industry features are grouped into ten sets of elements, which shapes the ten forces framework, reflecting the interaction among building-blocks of the industry with each other and with strategy implementation practice inside an organization. The chapter concludes by proposing the 'macro-environment, industry, and organization' (MIO) model, which could be utilized by integrating three levels of analyses.

INTRODUCTION

Although among some scholars there is consensus regarding the importance and effects of characteristics of different industries on activities and performance of organizations (Hrebiniak and Snow, 1980; Pfeffer and Leblebici, 1973; Porter, 1980), noticeable disagreement exists about degree of impacts of various industries. For instance, in a study by Schmalensee (1985), it was shown that industry context has very strong effects on investment's rate of return (industry effects accounted for 75% in industry return). However, the "small stable" effect of industry factors was reported by Rumelt (1991), who repeated almost the same study six years later. This argument was continued by McGahan and Porter (1997), who duplicated the original study by Schmalensee (1985) and Rumelt (1991). McGahan and Porter (1997), after a meticulous calculation, concluded that industry factors do have considerable impacts (19%) on the organization's activities and investment. While the findings of Schmalensee (1985)

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and Rumelt (1991) regarding influence of industry factors appeared to be contradictory, both studies are evidence of the effects of different contexts of different industries on organizations. The results of these two studies differed because they were conducted in two industries that are widely dissimilar. As McGahan and Porter (1997) found, the effects of service sector industries, the focus of Schmalensee's research, on organizations in these industries were much stronger than influence of manufacturing sector industries, which were the main focus of Rumelt's (1991) study.

Although the impact of industry characteristics on organizations and their strategy execution cannot be denied, organizations are not just passive receivers of instructions from industry. In fact, Chandler (1990), Griffiths and Zammuto (2005), and Teece (1993) agreed that industries and organizations "evolve together-that managerial choice can shape the environment/industry as much as the industry/environment shapes firms".

While in this research, focus is on the impact of industry characteristics on strategy implementation, we are well aware that execution of strategy is affected more strongly by some other factors such as intra-organizational elements (Aboutalebi and Tan, 2014), as well as the importance of time of execution, corporate-subsidiaries relationship, and business-specific factors and their complex combinations (McGahan and Porter, 1997).

Peng (2013) viewed industry as a group of firms producing products (goods and/or services) that are similar to each other. Industry is defined in the Multilingual Dictionary (2013) as "any part of the business of producing or making goods" or "hard work and effort". According to the Collins English Dictionary (2012), industry can be perceived as "organized economic activity concerned with manufacture, extraction and processing of raw materials, or construction". And the College Dictionary (2010), with some differences, defines industry as "the aggregate of manufacturing enterprises in a particular field", "any general business activity".

Unfortunately, none of the mentioned definitions portrait industry and sector in their fullest, so the researcher prepared a definition for each by considering all existing definitions. The *industry is a group of organizations or organized activities that are similar to each other in terms of their inputs, processes, outputs, context and customers with no geographical limitations*. Cluster and sector are two other concepts that sometimes are mistaken by industry. A *cluster is a limited number of similar or different organizations each of which acts as elements of relevant supply chain in a limited or specific geographical area*. The *sector is a set of interrelated industries that have some degrees of similarities to each other and noticeable differences with industries of other sectors*.

INDUSTRIES' INFLUENTIAL FEATURES IN STRATEGY EXECUTION

As a result of a systematic literature review approach to reviewing existing studies, 47 factors are identified that shape the features and building blocks of any industry. Although all industries have these 47 characteristics, the extent of each of the features may differ in varied industries. In other words, what makes distinction among different industries is the extent of each of these factors; for example, regarding the feature of 'technology', while all industries use technology, the technological level of different industries can be dissimilar considerably.

The 47 characteristics that are discussed and classified in this section are as follows: political power, government-industry relationship, federal government purchases, industry size, typical size of organizations, industry concentration, market uncertainty/risk, supply chain, distribution of resources, industry players, degree of competition versus cooperation, stages in an industry lifecycle, structure, dynamism/stability, customers, entry barriers, rates and types of innovation, product differentiation, nature of products, frequency of introducing new product/service, capital intensiveness, return on investment (ROI), financial structure, asset specificity, price range, growth/sales, excess capacity versus scarcity, specialized human asset intensiveness, regulatory environment and coercive pressures, culture, technology, frequency of inventing new technology, level of technological uncertainty, munificence/profitability, availability of financial resources, industry acquisition density, R&D intensity, manufacturing intensity, advertising intensity, market size, strong outside forces, demand instability, return on assets (ROA), staff combination, excitement/interest, asymmetry between firms, and industry complexity.

These 47 factors would shape ten groups of industry features based on the degree of similarities and connectivity among elements of each group. The ten sets of industry factors are the following: *Technology* (Technological level of an industry, frequency of inventing new technology, research and development intensity, innovation types and rates, industry complexity), *legislations* (government and industry relationship, regulatory environment, outside forces, political powers in industry), *uncertainty* (market uncertainty of industry, level of technological uncertainty, industry dynamism, demand instability of industry, degree of competition), *financial outputs* (market size of industry, growth of the industry, return on assets, return on investment, profitability of industry, price range in industry), *financial inputs* (financial structure of industry, asset specificity), *establishment* (entry barriers to industry, capital intensiveness, availability of financial resources, typical size of organizations in industry, impact of industry structure, federal government purchases), *supply* (supply chain, resource distribution of industry, industry players), *products* (product differentiation, nature of product, acquisition density of industry, frequency of introducing new product/service), *structure* (industry size, typical customers of industry, culture of industry, advertising intensity, specialized human asset intensiveness, staff combination of industry, stages in an industry life cycle, excitement of industry), and *operations* (manufacturing intensity, typical excess capacity, industry concentration, organizations' asymmetry of industry).

Legislations

Legislations are a set of official rules, laws, and policies that govern, guide, protect, and limit the industry's functions, customers, and its other stakeholders. While certain legislation may be common for some or all industries, other regulations can be exclusively developed for a particular industry. Almost all legislations are prepared and imposed by governments. This section discusses the issues that are associated with the institutional-based view (Peng, 2009), one of the three pillars of the strategy tripod.

Government and Industry Relationship

The relationship between government and industry depends on two main issues. One is the dominant economic system in a country (Zhu & Chung, 2014), which is not the focus of this discussion, and the other is the nature of the industry (Bitektine & Haack, 2015). Among the twenty-one mentioned industry sectors in the United Nations' industry classification, at least two directly concern the jobs done by governments such as public administration and activities of extraterritorial organizations (Flanagin *et al*., 2014). Even in some non-governmental industries such as food and pharmaceutical almost all governments regulate and control closely the activities of these industries that have direct effects on public health (Den-Hertog, 2014; MacKay & Chia, 2013). Sometimes government intervention in certain industries is because of maintaining (Jang *et al*., 2013) or increasing national competitiveness (Griffiths & Zammuto, 2005).

Regulatory Environment

Regulatory environment refers to either government regulations regarding industries or sector self-regulatory bodies (Hambrick & Abrahamson, 1995; Kleinbaum, 2012). Government regulations are more common and stronger factors such as antitrust enforcement (Katz, 2019). As correctly noted by Hillman and Keim (1995), and supported by Schuler, Rehbein and Cramer (2002), governments contribute to management or at least the monitoring of an industry by developing related policies:

Government policy determines the rules of commerce; the structure of markets (through barriers to entry and changes in cost structures due to regulations, subsidies, and taxation); the offerings of goods and services that are permissible; and the sizes of markets based on government subsidies and purchases. Consequently, gaining and maintaining access to those who make public policy may well be a firm's single most important political goal (Schuler et al., 2002, p. 659).

Some industries do not have any self-regulatory bodies, or these bodies do not have actual authority over their members (Suarez *et al*., 2015). On the other hand, industry-based regulatory bodies in some industries are powerful and influential in activities or even the existence of their members. International Air Transport Association (IATA) is an example of a highly important self-regulatory body (Cornelissen *et al*., 2015).

Outside Forces

Institutional powers that influence the activities of industries are not limited to governments or self-regulatory bodies in industries (Peng, 2009). Pressure groups and some of the non-governmental organizations can very negatively undermine performance and even the existence of organizations in the industry (Bitektine & Haack, 2015; Hambrick & Finkelstein, 1987)."General public views about different industries can be considered as one of the outside forces (Chang & Chang, 2014; Hambrick & Abrahamson, 1995). While the arms manufacturing industry has a negative image among the general public, the education industry is perceived positively (Pfeffer & Salancik, 1978; Suarez *et al*., 2015).

Political Powers in Industry

While some industries are known to be active in politics by lobbying politicians and financing particular political parties, other industries may not have noticeable involvement (Friesl & Silberzahn, 2012; Hillman *et al*., 2004). At the industry level, firms involved in corporate political exercises tend to be part of industries that are emphatically influenced by macroeconomic policies or other government choices (Buiren *et al*., 2019; Oliver & Holzinger, 2008; Yoffie & Kwak, 2001; Zhu & Chung, 2014).

Hillman and Hitt (1999) also contended that organizations or industries "with little involvement in impacting public policy are more inclined to participate in aggregate instead of individual political activities. Since successful aggregate activity advantages all organizations in an industry, the effect of such a strategy on a company's own particular game changer is liable to be restricted" (Feinberg & Gupta, 2009; Gratton, 2014).

The first proposition concerning the importance of *legislations* (political power in the industry, government-industry relationship, regulatory environment and coercive pressures, outside forces) in activities of industries emerges as a result of the discussion in this section:

Proposition 1: Industry-related 'legislations' can distinguish industries from each other.

Establishment

The 'establishment' concerns initiating new ventures through starting a new business by existing firms or setting up a new organization. Establishing a new venture may need different requirements in dissimilar industries. The frequency of having new ventures can be considered as the degree of the establishment. In industries with a high degree of establishment, it is common to start a new business more frequently either by current organizations or by new to the industry investors. In this section, establishment-related factors are discussed briefly.

Entry Barriers to Industry

Although new organizations are established every day, the number of startup organizations are not the same in different industries (Caves *et al*., 1984; Martin & To, 2013). One of the major factors influencing the numbers of startup organizations in various industries is entry barriers to industries (Gual & Mas, 2011; Porter, 1979, 2008). Organization literature has identified barriers to entry as a main issue that determines rivalry, and this has been regularly characterized regarding the level of capital intensity (Koch, 1974), economy of scale (Bitektine & Haack, 2015; Mcafee *et al*., 2004), or product differentiation (Kinal, 2013; Robinson & Mcdougall, 2001). Entry barriers to some industries are high or very high, and few new organizations have opportunities entering these industries (Ferrier, 2001; Zhu & Chung, 2014). These industries with high entry barriers can be considered as exclusive clubs for a limited number of exclusive organizations. On the other hand, there are industries with medium or low entry barriers that attract many new organizations (Nicholson, 2013; Scherer & Ross, 1990).

Capital Intensiveness

Capital intensity concerns the extent of required fixed assets/capital to establish or run an organization in an industry (Monin *et al*., 2013; Suarez *et al*., 2015). As stated by Chandler (1977, 1990), and confirmed by Yin and Shanley (2008, p. 54), "Firms in capital-intensive industries will have higher fixed costs and require greater economies of scale and scope to succeed".

Although, high-capital-intensity industries may benefit from having a limited number of competitors, they could face some serious difficulties as mentioned by Datta, Guthrie, and Wright (2005):

Capital intensity often creates strategic rigidity because fixed costs are high and deviations tend to be expensive. Firms in high-capital-intensity industries tend to focus on leveraging their investments, resulting in a greater concern for cost and efficiency considerations (Datta et al., 2005, p. 137).

While some industries such as manufacturing and petrochemical require high capital (Argyres *et al*., 2015; Martin & To, 2013), many others such as professional services or finance can be established and run with relatively low fixed assets (Ganco & Agarwal, 2009; Zhu & Chung, 2014).

Availability of Financial Resources

No organization can be established or run without having the required finance to do so (Bitektine & Haack, 2015; Katila & Shane, 2005; Shane & Stuart, 2002). New organizations regularly need sufficient funding to finance their activities and businesses (MacKay & Chia, 2013). Financing can be obtained by selling the company's shares, finding new investors, applying for business loans, selling unnecessary assets, or selling licensing or franchising (Schoonhoven & Jelinek., 1990). Venture capitalists can help new firm development in different ways (Katila & Shane, 2005). Lenders tend to treat industries differently in terms of the amount that can be lent to different industries (Bitektine & Haack, 2015). Industries with considerable fixed assets are more likely to secure a loan because lenders would be able to seize these assets instead of their money if the company has difficulties in repaying the loan (Katila & Shane, 2005; MacKay & Chia, 2013).

Typical Size of Organizations

Some industries embody organizations that are typically small, while the typical size of organizations in other industries may be medium, large, or very large (Miller & Ghen, 1994; Paton & Wagner, 2014). The size of an organization is "measured in terms of a total number of employees" (Swaminathan, 1995, p. 675). The typical size of organizations in an industry matters because this has impact on strategies (Chen & Hambrick, 1995; MacKay & Chia, 2013), competition (Monin *et al*., 2013), survival (Arthur, 2003), and resourcing (Narula, 2014). A study by Ferrier's team showed that "large firms have simpler competitive repertoires than small firms and are slower in terms of action timing" (Ferrier *et al*., 1999, p. 380).

Impact of Industry Structure

The structure of an industry concerns the way in which some of the main components of an industry are organized (Garcia *et al*., 2014; Perrow, 1984). As suggested by Bain (1968), and supported by Porter (1981) and Friesl and Silberzahn (2012), the major elements that shape the structure of a sector or industry are "entry barriers, the number of firms in an industry, and their size distribution". A sector's or an industry's structure can contribute significantly to performance and strategizing activities of the organizations in the sector or the industry (Barabasi, 2002; Watts, 2003; Yu *et al*., 2008). The structure reflects the common behavior and actions of the member organizations in the industry or sector (Piskorski, 2013). Industry structure is critical in light of the fact that structure influences conduct, or strategy (Porter, 1981), which in turn has effect on strategy execution (Bain, 1968; Cornelissen *et al*., 2015).

Federal Government Purchases

Governments can be the biggest customers of some industries in many if not all countries (Kleinbaum, 2012). The importance of government purchases can widely differ in various countries depending on the dominant economic and political systems in those countries (Zhu & Chung, 2014). In a country with a free market economy where everything is privatized, government purchase may not be significant (Royer, 2012). Regardless of economic or political systems in countries, some industries such as infrastructure construction, or military air and space, almost completely depend on purchase by national governments (Sharma & Crossler, 2014).

The second proposition of this study that highlights the roles of '*establishment*' (entry barriers to industry, capital intensiveness, availability of financial resources, typical size of organizations in industry, impact of industry structure, and federal government purchases) in defining an industry emerges from discussion:

Proposition 2: There are significant divergences among separate industries in terms of their 'establishment'.

Financial Inputs

Financial inputs concern the typical format, type, and amount of investment to establish or run a typical organization in an industry. Although there is a need for investment to start or continue the existence and activities of an organization in any industry, the required financial inputs may not be the same in all industries. The required financial inputs to start or run an organization in an industry can act as major entry barriers to that industry. Only a limited number of very large investors could enter an industry that requires high initial investment.

Financial Structure of Industry

The average debt to equity ratio is considered as a financial structure of an industry or even an organization (Bitektine & Haack, 2015). While in some industries ratio of debt to equity is low (organizations receive small loans and credit compared with their own finance), in others, it can be medium or high (Chadwick *et al*., 2015; Majumdar *et al*., 2018). High debt increases the risks and the possibility of collapse due to over-stretching organizational resources (Mount, 2013). On the other hand, expansion based on the borrowed money would be more common in industries with higher debt to equity structure. Faulty financial situations in an industry may lead to some organizational emergencies (Bitektine & Haack, 2015). The importance of financial lenders such as banks would be much higher in industries with higher debt to equity ratio (Pfeffer & Leblebici, 1973).

Asset Specificity

Asset specificity implies the degree that assets can be productively redeployed if their initial use demonstrates infeasibility (Teece, 1980, 1982).“Industries characterized by high asset specificity foster responsibility among staff in terms of using the least assets to do their jobs, because it would be expensive to redeploy the assets that are already being used for less profitable activities (Dobni *et al*., 2015). As stated by Yin and Shanley (2008, p. 279), “Large-scale assets will often involve considerable sunkness and that small-scale assets will be more fungible”. There are assumptions that agriculture and manufacturing-related industries are high asset specificity (Friesl & Silberzahn, 2012), while service-related industries have low or low-to-medium asset specificity (Bitektine & Haack, 2015). There might be less willingness to invest in industries with high asset specificity especially by newcomers due to a higher risk of unwanted long-term involvement in a not-so-profitable industry.

Another issue that can be considered as one of the factors that separate industries from each other is '*financial inputs*' (financial structure of industry and asset specificity), which is reflected in the following proposition:

Proposition 3: The 'financial-inputs' can to a significant degree lead to differences between distinct industries.

Supply

Supply refers to the exchange of materials, parts, machinery, information, goods or services among organizations, in order to support their production or provision of services. Regarding the importance of supply for industries, it is stated that, "No company can survive without receiving the supplies required for making/providing products/services or without the distributors necessary for selling its products/services" (Aboutalebi, 2016, p. 1). While the importance of supply can be the same for all industries, the nature and activities of supply may not be the same.

Supply Chain

Although every industry has its own supply chain (Mount, 2013), these supply chains can be hugely different from each other in terms of complexity, length, degrees of vertical or horizontal integration among the chain members, or amount of exclusivity in various industries (Aboutalebi, 2016). For example, the movie industry has very limited and exclusive distributors with only seven movie distributors that are in charge of more than 70% of movie distribution worldwide. While the financial industry has a short supply chain, the length of the supply chain in the automobile industry can be huge (Royer, 2012).

Resource Distribution of Industry

Industries are different regarding the distribution of resources (Van Witteloostuijn & Boone, 2006) or higher-order resources (Wibbens, 2019). Some industries have homogeneous, and others, heterogeneous resource distributions (Sila, 2013). Homogeneous distribution of resources may intensify competition for these resources among organizations in the industry (Kleinbaum, 2012). In contrast, heterogeneous distribution of resources makes "competition takes place within distinct niches, with little competition between them" (Yu *et al*., 2008, p. 462).

Industry Players

Supply in an industry may be affected by the number or size of the industry players. Industries can be distinguished from each other based on certain competitors with similar powers (MacKay & Chia, 2013). While the aviation industry includes only a few hundred airlines in the world, the food retail or agriculture industry consists of millions of players in almost every country (Royer, 2012). The number of players in an industry is not related to the technological level of that industry (Park & Jang, 2014). One of the most exclusive is beverage, which is known to be one of the least technological industries and dominated by only two players, Pepsi and Coca-Cola.

By considering all these opinions, the research can identify another industry feature, namely, '*supply*' (supply chain, resource distribution of industry, and industry players), which differs in various industries. This view is reflected in the fourth proposition.

Proposition 4: The 'Supply' activities of industries can distinguish the industries in significant degrees from each other.

Technology

Technology refers to the extent to which an industry relies on industry-specific machinery or non-machinery to perform its required industry-related tasks for survival and growth. Therefore, technology is not just about machinery. It also includes skills, methods, software, and processes (Dobni *et al*., 2015). "Technology constrains the variation in how things are done by defining *what* is being done" (Chatman & Jehn, 1994, p. 526). If the same technology at the same level for the same function with similar frequencies is used by all industries, it can be claimed that technology is not the factor that distinguishes industries from each other. The following literature review assesses this argument and its counter.

Technological Level of an industry

Although technology is used in all industries, the technological levels of different industries are not the same (Chatman & Jehn, 1994). Certain industries are more technology-dependent than others. While some are considered to have a very high technological level (very high-tech), others may have high, medium, low, or even very low technological levels (Jani & Han, 2013).

Building on Thompson's (1967) typology of technology, there are three groups of industries: long-linked, mediating, and intensive. In all long-linked, or serially reliant industries, the common form of technology is an assembly line. Unlike long-linked industry, which has one assembly line for different products, industries with mediating technology use semi-customized technology for a homogeneous group of projects and customers. Industries with intensive technologies rely on less complex but customized technology for every project (Zhu & Chung, 2014). Based on Thompson's (1967) typology, long-linked industries have higher technological level than the rest, and mediating industries are more technological than those with intensive technology (Dobni *et al*., 2015).

Frequency of Inventing New Technology

Technology can become obsolete when customers want new products or services with new technologies (Slack *et al*., 2013; Zammuto & O'connor, 1992). To fulfill customers' needs, new technology may need to be invented. In some industries such as computing and telecommunication the rate of technological invention is high (Oliveira & Gimeno, 2014). However, in other industries such as mining or oil and gas new technology is rarely introduced (Bai & Sarkis, 2014). New technologies and enhanced strategies are regularly joined in light of the fact that they are identified with the type of work carried out in a particular industry (MacKay & Chia, 2013; Pfeffer & Salancik, 1978).

Research and Development Intensity

Research and development (R&D) intensity reflects the degree to which an industry invests in creating new methods, products or services (Chadwick *et al*., 2015). Industries can be widely different from each other based on the typical percentage of their incomes invested in R&D (Miller & Bromiley, 1990). Some industries have high R&D intensity. This means they invest much of their incomes in developing new products or services such as pharmaceutical industries, which spend around 50% for medication development (Cornelissen *et al*., 2015). New product development and investment in research can be insignificant in some industries (Loury, 1979).

Innovation Types and Rates

Innovation may occur in every industry, but types and rates of innovation can differ in dissimilar industries. Rate of innovation refers to the frequency of inventing new methods, products or services in a particular period, normally in one year. In some industries such as fashion or music the rate of innovation is high, in which case a considerable number of new products or services are introduced in one year (Garud *et al*., 2002; Sheremata, 2004; To *et al*., 2015). Some industries may not invent even one new product or service in more than a decade, such as energy. Speed of innovation also depends on speed of knowledge absorption by the organizations in the industry (Moreira *et al*., 2018).

Type of innovation concerns the extent to which new product, service or method is different from those existing. There are some innovation typologies as that proposed by Sheremata (2004) which assess innovation around two measurements: "level of originality (radical or incremental) and the level of similarity of new innovated items/services with existing ones (consistent or inconsistent)". New to the world innovation, as the extreme type of innovation, refers to the invention of those entities that never existed such as the first airplane or the first computer (Dewar & Dutton, 1986; Pansiri, 2014). The most common type of innovation makes a minor modification to existing entities (Singh *et al*., 2014). Dominant types of innovation can be different in various industries (Cornelissen *et al*., 2015).

Industry Complexity

As suggested by Child (1972), the industry complexity can be defined as the degree to which the environment of the industry is heterogeneous. The industry complexity can be because of "competitive complexity, market diversity, resource complexity, and process/technology complexity" (Cannon & John, 2007). Technology complexity is one of the important contributors to industry complexity (Curty & Zhang, 2013). Technology complexity is a combination of some technology-related issues such as technological level of an industry and frequency of inventing new technology (Dess & Beard, 1984; MacKay & Chia, 2013). While some industries are highly complex such as telecommunication or pharmaceutical (Zhu & Chung, 2014), other industries may not be very complex such as construction or public services (Fremeth & Shaver, 2014; Qu *et al*., 2011).

The roles of *technology* and technology-centered issues (technological level of an industry, frequency of inventing new technology, R&D intensity, rates and types of innovation, and industry complexity) in characterising an industry is demonstrated in the fifth proposition regarding features:

Proposition 5: There are significant differences among various industries in terms of their 'technology'.

Operations

Operations refer to the process of turning the inputs to the intended outputs. Operations are concerned with the efficient and effective production of goods or provision of services, and in an industry can cover a variety of issues. However, in this research the focus is on those factors that are mentioned in the literature as influential in shaping and defining an industry.

Manufacturing Intensity

Although it is common to assess the manufacturing intensity of an industry by calculating average number of products or hours of services in a typical organization within that industry annually (Piskorski, 2013), manufacturing intensity can be measured as “the ratio of the monetary value of manufacturing and the monetary value of shipments in each industry during a year” (Dean & Snell, 1996; Katila & Shane, 2005).

Manufacturing or service provision intensity in some industries such as telecommunications or electronics industries are high to very high (MacKay & Chia, 2013), while this intensity can be much lower in other industries such as professional services or ship-building (Galbraith & Kazanjian, 1986; Katila & Shane, 2005). In manufacturing-intensive industries, learning of the manufacturing procedures is important for effective new product/service development (Aboutalebi, 2017; Zhu & Chung, 2014).

Typical Excess Capacity

Excess capacity or under-capacity in operations can occur due to the difficulty of forecasting the demand precisely. According to Porter (1980, p. 325), in highly competitive industries with many competitors, “undercapacity in an industry is rarely a problem,” but “industry overbuilding is a chronic problem”. Having some degree of excess capacity to cover unexpected demand may be common in some industries such as manufacturing or transportation, but not in all industries (Cornelissen *et al*., 2015). Those industries that produce products or provide services that are seasonal probably face the issues of overcapacity or under-capacity regularly (Ackerman, 1970).

Typical excess capacity in an industry can closely relate to typical customers in that industry (Cornelissen *et al*., 2015). In industries that only deal with business customers, the least excess capacity is expected because business customers’ orders are generally stable and completed well in advance. Therefore, there is no need to have unusual and unused excess capacity to cover volatile orders (Martin & To, 2013).

Industry Concentration

The operations of an industry might also be affected by the extent of its concentration. The sector or industry concentration concerns the degree to which market shares are fragmented or concentrated within a sector or industry (Scherer & Ross, 1990). If an industry is concentrated, a limited number of very large organizations has the majority of market shares in that industry (Qu *et al*., 2011; Scherer & Ross, 1990). The economy of scale in operations is more attainable in concentrated industries; large organizations benefit from large-scale operations that can be cost saving.

The industry concentration can also be used as one of the measures to assess the degree of competitiveness in an industry (Datta *et al*., 2002; Gual & Mas, 2011). The competition among these limited competitors is expected to be low (Kleinbaum, 2012; Wu *et al*., 2014). Industry concentration is high in aviation or food retail industries that are dominated by a relatively small number of companies (Bitektine & Haack, 2015). In less concentrated industries, competition would be high among a large number of competitors (Sharma & Crossler, 2014). Profitability may be low in industries with less degree of concentration due to high competition, which may lead to lower price and lower profit (Cherif & Grant, 2014; Yin & Shanley, 2008).

Organizations' Asymmetry of Industry

An industry's operations might be influenced to some extent by the degree of asymmetry among the organizations that shape the industry. Asymmetry describes differences among organizations in the same industry. High degree of asymmetry among an industry's organizations might reflect or lead to higher differentiations in their operations. The possible importance of the degree to which organizations are asymmetric in an industry and distinguishes industries from each other is mentioned in two or three studies only. Gual and Mas (2011) claimed that "the more asymmetric the organizations, the more improbable are they to conspire. The more diverse the organizations, the more troublesome it may be for them to consent to a required strategy. At the point when there is significant asymmetry, it may be less demanding for the main organization or organizations to adventure their predominant position".

The above discussion summarizes a sixth industry-centered proposition regarding *operations* (manufacturing intensity, typical excess capacity, industry concentration, and organizations' asymmetry of industry):

Proposition 6: The 'operations' can to a significant degree create differences among various industries.

Products

Products refer to the intended final outputs of organizations that can be exchanged for money or other perceived values. These can be in the form of goods, services or combination of both. Organizations from identical industries may try to attract various target customers by making some changes in their products in terms of size, design, colour, quality or packaging. Although some differences are expected in products of organizations in similar industries, fundamental dissimilarities may be observed between products of different industries.

Product Differentiation

While goods or services in some industries are standardized and similar, in other industries goods or services may be differentiated with recognizable differences (Datta *et al*., 2005; Zhu & Chung, 2014). In industries with standardized goods or services, organizations need to reduce costs and increasing efficiency to survive (Porter, 1980; Sila, 2013). Conversely, in industries with differentiated products, cost is a secondary issue to more important factors such as branding (Datta *et al*., 2002), design (Bitektine & Haack, 2015), and quality (MacKay & Chia, 2013). Regarding importance of product differentiation, the study by Gual and Mas (2011) found that:

The more differentiated the products in an industry, the less likely it is that anti-competitive behavior takes place since companies focus competition on characteristics other than price. Differentiation is *in itself a source of market power, and therefore it is developed endogenously by companies, through investment in R&D and advertising (Gual & Mas, 2011, p. 218).*

Nature of Products

One of the major factors that separate industries from each other is the nature of the products they produce or services they provide (Cornelissen *et al*., 2015). Some industries are just service providers with no physical goods, while other industries may just produce goods with limited or no services (Kinal, 2013). The products of some industries are long-lasting, such as construction or car manufacturing, in contrast to others whose products can be unusable after only a few days such as the dairy industry (Kleinbaum, 2012).

Hambrick (1983, p. 688) suggested some other features that shape the nature of a product and distinguish industries from one another including“high product dynamism (new item deals and rate of innovative change), product sophistication (requirement for subsequent service and purchase by the experts), high vulnerability (import-focused products with high labour costs), and perceived quality (durability).

Acquisition Density of Industry

Although acquisition may occur in every industry, the number and frequency of taking over other organizations are noticeably higher in some industries (Aalbers & Dolfsma, 2014). The acquisition may be more common in those industries where economy of scale is crucial for survival (Kleinbaum, 2012). The acquired organization and its acquirer are expected to reduce the costs of their productions by benefiting from the higher capacity for production due to the economy of scale (Aalbers & Dolfsma, 2014; Doan *et al*., 2018). Some scholars believe higher acquisition density in an industry can show a lack of willingness for competition by taking over the competitors (Bitektine & Haack, 2015).

Frequency of Introducing New Product/Service

Industries are different in terms of number of new products or services they develop in one year (Piskorski, 2013). In some industries such as car manufacturing, it is common to see the introduction of one new model of car every year. In the energy industry, one new product may be developed in every decade or longer (Zhu & Chung, 2014). The degree of the newness of products and services can differ remarkably. In fact, the vast majority of the products or services that are introduced as new, are just slightly modified version of already existing products or services (Tong *et al*., 2015). Some industries are capable of developing new products or services more frequently than others due to the low costs and higher speed of new product development in those industries (Friesl & Silberzahn, 2012).

The seventh proposition highlights one of the commonly acceptable factors, namely, *products* (product differentiation, nature of product, acquisition density of industry, and frequency of introducing new product/service), which defines the industry:

Proposition 7: Variation in ‘products’ would lead to significant differentiation among non-identical industries.

Financial Outputs

Financial outputs are the end results of investment in an industry that indicate the amount, speed, and continuity of incomes from the investment in that industry. The decisions on whether to establish, maintain, grow or abandon organizations in an industry depend considerably on potential financial outputs from the industry. Financial viability is relevant in every industry even in governmental and charity. Financial gains from the investment in varied industries may be very different in dissimilar industries.

Market Size of an Industry

Market size of an industry can be measured as the total annual sales in that industry (Piskorski, 2013). It does not necessarily reflect the profitability of the industry (Anderson & Vakulenko, 2014). The sizes of markets change as industries advance (Katila & Shane, 2005; Utterback, 1994). An industry with a large market size is more likely to attract new investors with large investments than an industry with a small market (Cornelissen *et al*., 2015). Also, the industry with a large market requires "more comprehensive capabilities in coordinating marketing and customer care than new firms generally possess" (Tripsas, 1997, p. 12). The market size of dissimilar industries can be different to a large extent (Hetzel, 2014; Shane, 2001).

Growth of the Industry

For Pfeffer (1982), one of the most influential scholars working on industries and sectors, the "growth rate is characterised as (1) the percent change in incomes and (2) the percent change in number of staff. While rate of growth of some technology industries in general and the Internet-based industries in specific during relatively short period have been remarkable and unprecedented (Malhotra & Hinings, 2015), some other industries either had small growth or even have declined (Datta *et al*., 2005; Zhu & Chung, 2014).

A variety of factors may impact the industry's growth or decline such as invention of new technology (Bitektine & Haack, 2015; Hambrick & Finkelstein, 1987) or the industry's life cycle (Jang *et al*., 2013; Sutton, 1991). Development of new technology, which can decrease industry uncertainty (Cornelissen *et al*., 2015; Thompson, 1967), may contribute noticeably to growth (Katz & Kahn, 1966; Peng *et al*., 2013).

Return on Assets (ROA)

Return on assets (ROA) is a well-comprehended and broadly utilized financing measure of operational execution in any industry (Zajac & Westphal, 1996). An industry's ROA can be measured as the normal industry's ROA over the initial three years (Shen & Cannella, 2002). Some industries require massive assets for very high investment, but it is worth it due to the high return on these assets (Chang & Wu, 2014). In contract, ROA can be low to very low in other industries regardless of required assets for establishing the organization (Bitektine & Haack, 2015). Therefore, having high assets does not necessary mean having high ROA (Jain & Singal, 2014).

Return on Investment (ROI)

A ratio with a close connection to ROA is returns on investment – ROI (Brauer & Schmidt, 2006). Generally, an industry with high assets requires high investment, although investment in an industry can be almost independent of its required assets (Zhu & Chung, 2014). For example, the pharmaceutical industry requires very high investment in its research and development, which are not considered as assets (Nicholson, 2013). ROI can be widely different in industries (Suarez *et al*., 2015). For this reason, it can be used as one of the features that distinguish industries from each other (Bitektine & Haack, 2015).

Profitability of Industry

Industry profitability gives indication of the level of profit development or decreases inside an industry normally during one year (Mcnamara *et al*., 2008). Although there is a relationship between sales and profitability, this is not always direct or positive (Bitektine & Haack, 2015; Qu *et al*., 2011). Sales or market size of some industries may be high, but their profitability may be medium or even low such as retail industry or aviation (Brauer & Wiersema, 2012). Some service provider industries that may not need large investment can be among the most profitable such as banking, professional services, and health industries (Singh & Mishra, 2014). The initial profitability of some service-based industries may decline if so many organizations enter the race (Castrogiovanni, 1991; Piskorski, 2013). Profitability may be reduced if an industry requires heavy investment in fixed assets such as mining or agriculture (Goll & Rasheed, 2005; Sultan & Saurabh, 2013).

Price Range in Industry

While in some industries such as ship-building or construction, the price of one finished product can range from £100,000 to more than £1,000,000,000, in others, the price range of one unit of product or service can be no more than a couple of pounds (Dobni *et al*., 2015). Even the common pricing strategies, for example, high-low pricing, everyday low pricing, or premium pricing, are not the same in different industries (Kleinbaum, 2012). Although price range and pricing strategies are not exclusive indicators for separating industries from each other (Zhu & Chung, 2014), it can to some extent help distinguish between them (Curty & Zhang, 2013).

There is support for the view that amount of '*financial outputs*' (market size, growth, return on assets, return on investment, profitability, and price range) of various industries is almost unique for each industry. The eighth proposition highlights this matter:

Proposition 8: The 'financial-outputs' of industries may be different from each other at significant levels.

Uncertainty

Uncertainty is the extent to which the industry-related changes may not be predictable due to unprecedented speed, type or spread of the change in the industry. Different industries experience different degrees of uncertainty (Pfeffer & Salancik, 1978; Swoboda *et al*., 2014). The extent of uncertainty in an industry can have noticeable effects on decisions to invest, renew, divest or continue business. Industry uncertainty may be the result of some factors such as the market uncertainty of an industry, the level of technological uncertainty, demand instability or industry dynamism.

Market Uncertainty of Industry

One of the influential factors in industry uncertainty is market uncertainty (Hrebiniak & Snow, 1980; Jelassi *et al*., 2014), which describes changes in the average sales of an industry (Westphal & Milton, 2000; Zajac & Westphal, 1996). Changes in sales may occur because of changes in prices, customers' preferences or competitors' actions (Bitektine & Haack, 2015). As stated by Hrebiniak and Snow (1980, p. 755), "Industry is associated with varying levels of the different types of environmental uncertainty". Although market uncertainty may exist in every industry, the degree of uncertainty can be considerably different in dissimilar industries (Huang, 2014; Piskorski, 2013).

Level of Technological Uncertainty

Technology as a key enabler of the industry is not stable (Sher & Kim, 2014). Two sets of interrelated technologies may exist in any industry: the technology in the finished products or services and the technology to produce the products or provide the services (Bourgeois & Eisenhardt, 1988; Kleinbaum, 2012). Technological change that creates technological uncertainty may be genuinely persistent in a few industries, but irregular and less unsurprising in others (Argyres *et al*., 2015). The level of technological uncertainty may have impacts on the recruitment of more specialist managers and on shaping new alliances to share the costs of investing in new technology (Yin & Shanley, 2008). It is expected that level of technological uncertainty will be high in technology industries in comparison with non-technology industries (Perez-Franco, 2014). Technological uncertainty would contribute to the overall uncertainty in the industry (Cornelissen *et al*., 2015; Pfeffer & Leblebici, 1973).

Industry Dynamism

Industry dynamism concerns the level of changes inside of an industry (Grossman, 2014; Randolph & Dess, 1984). Castrogiovanni (2002), furthermore, considered "the frequency, degree, and unpredictability of changes", which may occur in the industry. It has been proposed that industry dynamism has a critical influence on the manner of rivalry, characterizing the degree to which a firm faces an environment that is unsurprising and stable or changing and uncertain (Kinal, 2013; Monin *et al*., 2013). Various industries may have different degrees of dynamism (Qu *et al*., 2011; Zhu & Chung, 2014). Some industries are more stable than others (Datta *et al*., 2005; Mcnamara *et al*., 2008). The dynamic capabilities of the organizations shaping an industry might contribute to some extent to industry dynamism (Warner & Wäger, 2019).

Demand Instability of Industry

Demand instability in the industry is not just about degree of changes in demands (Hambrick & Abrahamson, 1995; Zhu & Chung, 2014); it is also about frequency and predictability/unpredictability of the changes in demands (Jenkins, 2014). An industry with high changes in predictable demands can be more manageable than an industry with medium changes in unpredictable demands (Bitektine & Haack, 2015).

As stated by Hambrick and Abrahamson (1995), one of the results of demand instability in the industry is the creation of "uncertainty about means-ends linkages, and managerial discretion is thus enhanced." Industries that mainly or only rely on the consumer (end-user) customers are expected to have more demand instability than those that do business only with other businesses (Dearlove & Crainer, 2014).

Degree of Competition

One of the issues which may have an effect on the uncertainty of an industry is the degree of competition in that industry (Kleinbaum, 2012). Competition can be calculated by considering the number of organizations that produce or sell the same product or services in the same market in one year (Ellero & Pellegrini, 2014; Katila & Shane, 2005; Tushman & Anderson, 1986). That is to say, not everybody is satisfied with these studies in the way competition is evaluated. Measuring the degree of competition can be misleading if only number of competitors is considered without attention to the size of competitors and their market shares (Fosfuri *et al*., 2013; Gras & Krause, 2019; MacKay & Chia, 2013). A study by Katila and Shane (2005, p. 816) found that industries can be distinguished from each other based on "the number of competing firms they contain because bandwagon effects, economic factors, and the attractiveness of a market at a given point in time all influence number of competitors".

Thus, the ninth proposition can be based on these arguments about *uncertainty* (market uncertainty/risk, dynamism, technological uncertainty, demand instability, and degree of competition):

Proposition 9: Industries' 'uncertainty' would create significant differentiation among dissimilar industries.

Structure

Structure refers to the organization, projection, and nature of an industry in terms of its format, identity, and stakeholders. Structure is a multidimensional phenomenon that shapes an industry in accordance to the inner- and outer-industry environment. While the structure of an industry is not too rigid, it is not a highly flexible or changeable entity either. Although the factors that shape structure are the same in various industries, each industry may have its own unique structure because of the differences in intensity of each of the factors in these industries.

Industry Size

According to Fredrickson et al. (1988, p. 265), "The number of firms indicates the size of the industry". Different industries have different sizes (Khamseh & Nasiriyar, 2014). The size of an industry can have effect on strategy implementation due to its correlation with other industry characteristics such as level of competition, industry life cycle, uncertainty/risk, specialized human resources, and return on investment (Cornelissen *et al*., 2015).

As the number of organizations inside an industry increases, the likelihood of reaching consensus among them regarding accepted strategies or behavior diminishes (Pfeffer & Leblebici, 1973). Industries with a limited number of organizations are more likely to have a harmonized set of actions and strategies (Piskorski, 2013). In small sized industries, it may be difficult to find specialist managers with experience of strategy implementation (Khamseh & Nasiriyar, 2014). On the other hand, the bigger the number of organizations, the bigger the number of available employees in the industry. Therefore, it is more likely to have managers with relevant work and strategy implementation experience in the industry (Lantz & Hjort, 2013; Pfeffer & Leblebici, 1973).

Typical Customers of Industry

Dissimilar industries have dissimilar customers in terms of their types, requirements, and needs (Hathroubi *et al*., 2014). In some industries, the only customers are other organizations, business customers, which are limited in number and have long-term and stable needs (Jani & Han, 2013). For example, a still producing company does not do business with an end-user customer who needs one set of still plates for her home (Royer, 2012). Other industries, especially those that are service providers, may mainly or only have consumer customers who receive the services for their own short-term personal use (Cornelissen *et al*., 2015). Education or public industries mainly depend on consumer customers with very changeable and mid-term demands (Zhu & Chung, 2014).

Advertising Intensity

This issue is closely linked to the previous discussion – typical customers. Advertising intensity in the industry highly depends on typical customers of that industry (Kleinbaum, 2012). Those industries that mainly or only rely on a large number of consumers are more likely to push for a high-intensity advertising campaign (Piskorski, 2013). In contrast, there are industries that work with one or a limited number of business customers. These industries do not need to invest in advertising to find customers (Bitektine & Haack, 2015). That is to say, for the sake of brand recognition, some of the organizations in these industries may run strong advertising campaigns such as Intel Corporate that produces microprocessors for other companies but still has regular advertising.

Culture of Industry

The culture of an industry is shaped mainly by a common value system originated from the professional etiquettes of the main professions in the industry (Epstein *et al*., 2015; Gordon, 1991). The main professions and their etiquettes in different industries are not identical. Thus, it is reasonable to assume that dissimilar industries have a varied culture (Chatman & Jehn, 1994; Zhu & Chung, 2014). For example, the culture of support and cooperation in some industries is stronger than in others (Epstein *et al*., 2015). The industry's culture would also be affected partly by national cultures (Gagliardi, 1986; Pansiri, 2014). The culture of an industry has some effects on the behavior of employees including strategy implementation performance (Piskorski, 2013). However, this effect should not be exaggerated because "the culture is not deterministic of specific forms but exerts an influence upon the *nature* of the forms that will be developed" (Gordon, 1991, p. 398)".

Specialized Human Asset Intensiveness

Every industry requires some highly skilful staff, but this need for specialists is not the same (Yin & Shanley, 2008). While some industries require a large number of highly specialized employees to deal with highly complex or technological machinery, programs or systems, the other industries mainly rely on low or average-level skilled/specialized staff (MacKay & Chia, 2013). "Industry-specific human capital has less firm specificity, since any professional can move from firm to firm throughout a market without diminishing the value of his or her industry-specific human capital" (Pennings *et al*., 1998, p. 427).

The education industry, for example, has very highly specialized human asset intensiveness (Chatman & Jehn, 1994; Singh *et al*., 2014). At least 50% of employees at universities and colleges are highly educated and specialized (Zhu & Chung, 2014). In contrast, in an industry such as retail, a small number of the staff have sale-related degrees or specialities (Pennings *et al*., 1998; Suarez *et al*., 2015).

Staff Combination of Industry

There have been some changes in staff combination of industries, but still certain industries are known to be almost totally dominated by men such as mining and steel (Monin *et al*., 2013). Arthur (2003) examined gender diversity in the workplace, and sought to identify the proportion of female employees in one industry. In addition to staff gender, other criteria such as the number of part-time staff or staff with temporary contracts in comparison to those with long-term or permanent contracts can be considered (Chatain, 2014). For instance, the tourism and hospitality industry is well known for its low job security due to having a high proportion of staff with temporary contracts and part-time jobs. It is claimed that there is a correlation between the nature of jobs in the industry and staff combination in that industry (Curty & Zhang, 2013). Mining is a very difficult and dangerous job, so women do not show any desire to be recruited in the mining industry.

Stages in an Industry Life Cycle

Every industry or sector may go through a life cycle that starts from initial formation and after a few stages might finish by collapse or reborn as part of a new industry. The complete cycle of sector or industry life is described by McGahan et al. (2004):

Industries begin in a period of fragmentation as companies experiment with different approaches. With time, a scalable approach emerges as a dominant model. As the dominant model develops, an industry goes through a shakeout as unaligned firms are forced to exit. Eventually, firms find it difficult to improve their productivity on the dominant model at high rates, volume growth hits a point of diminishing returns, and the industry enters maturity. Ultimately, as volumes drop because of saturated demand or exhausted supply, the industry moves into decline (McGahan et al., 2004, p. 2).

Another industry life cycle, suggested by Agarwal et al. (2002), may be divided into just two phases: growth and maturity. This industry life cycle is too simplistic. Some industries such as Internet-based industry are in their infancy stage of life, while others are in their growth, maturity, or decline stage (Kleinbaum, 2012). That is to say, the length of the life cycle of different industries can be widely different (Wang & Shaver, 2014). While the agriculture industry after more than a millennium is still in its maturity stage (Sila, 2013), some technology industries after a few decades may be considered to be declining (Monin *et al*., 2013).

Excitement of Industry

McNamara and Bromiley (1997) argued that "staff's cognitive sensation in an industry may be influenced by 'the fads-and-fashions effect' of that industry that indicates the degree of excitement of attraction of the industry". In other words, all industries are as exciting as each other. The study by McNamara and Bromiley is only one of two publications that claim the excitement of an industry can be considered as a distinguishing factor for distinguishing industries.

The tenth industry-based proposition is based on the above discussion regarding the importance of *structure* (industry size, typical customers of industry, culture of industry, advertising intensity, specialized human asset intensiveness, staff combination of industry, stages in an industry life cycle, and excitement of industry):

Proposition 10: Industries can be distinguished in significant degrees from each other based on their 'structure'.

METHODOLOGY: SYSTEMATIC LITERATURE REVIEW

This study relies on a systematic literature review. The review question was defined and inclusion and exclusion criteria identified (Boland, Cherry, and Dickson, 2013). Inclusion criteria were published studies in top-ten related journals, which have at least one of the nine industry keywords. To determine the studies that could be included in this systematic literature review, first, a list of the most relevant keywords were prepared that reflect the notion of industry and its features. This resulted in nine keywords: 'industry feature', 'industry characteristic', 'industry determinant', 'industry force', 'industry factor', 'industry component', 'industry aspect', 'industry specification', and 'industry element'.

This research considers the building-blocks of the industry and their potential impacts on the execution of the strategy. The top-ten relevant journals were searched for industry-related characteristics, determinants, and building blocks. These journals are *Administrative Science Quarterly* (ASQ), *Academy of Management Journal* (AMJ), *Academy of Management Review* (AMR), *Long Range Planning* (LRP), *Strategic Management Journal* (SMJ), *Global Strategy Journal* (GSJ), *Strategic Organization* (SO), *Journal of Economics and Management Strategy* (JEMS), *Industry and Innovation* (II), and *Journal of Industry,* and *Competition and Trade* (JICT). However, the search of industry-related factors was not limited to papers in the top-ten journals. Wherever references were made to other reputable journals, conferences, or books, these publications were also reviewed. Some relevant papers were identified and considered in this paper.

In order to find relevant publications on *industry characteristics*, nine keywords were used in the online format of all the journals. The results of the search can be seen in Table 1.

The search engine of these journals was set in a manner to permit exploring these keywords in the abstract section of each paper. Nearly 600 publications were identied and some included more than one keyword, so they are mentioned more than once in table 1. After ignoring the repeated publications, which contained more than one keyword, 563 papers were found. Then, the exclusion criterion was considered to narrow-down this number of publications. A thorough examination of each of the papers revealed that in the vast majority, there are no discussions regarding the characteristics of the industry. Thus, they were excluded from further investigations in this study.

Table 1. Number of Papers Found by Using Nine Keywords

Keywords	Name of Journals									
	ASQ	AMJ	AMR	LRP	SMJ	GSJ	SO	JEMS	II	JICT
Industry feature	1	1	1	3	12	0	3	1	1	3
Industry characteristic	2	17	6	22	62	5	4	5	0	15
Industry determinant	1	0	1	7	80	4	4	0	1	0
Industry force	1	0	3	12	20	0	2	2	0	0
Industry factor	1	6	1	61	116	9	8	1	0	1
Industry aspect	0	2	0	17	21	1	1	1	0	0
Industry dimension	0	0	1	10	38	1	3	0	1	2
Industry component	1	0	0	17	39	2	1	2	1	0
Industry element	0	1	2	6	10	1	0	0	0	0

Source: Developed for this study.

Of the 563 publications, 176 had some relevant information about the characteristics of industries or their impact on strategy implementation. It is important to mention that the topics and focus of almost none of these publications were industry characteristics or the effects of the industry, so the relevant information were very limited.

GROUPING INDUSTRY CHARACTERISTICS FOR MODELING

In the search of the features that shape an industry, 47 characteristics were identified, each of which supported with a range of scholars whose studies are published either in top-three management journals (*Administrative Science Quarterly*, *Academy of Management Journal*, and *Academy of Management Review*) or in other journals. As shown in the following tables, the number of publications in support of each industry feature is noticeably different. While some of the industry features (e.g. Asymmetry between firms or Manufacturing intensity) are suggested only by one or two researchers, other industry characteristics (e.g. Industry Concentration or Growth/Sales) are heavily endorsed by more than 40 studies.

Table 2. Number of Supporting Publications for each Industry Characteristic.

Industry Characteristics	Number of supporting publications	
	ASQ, AMR or AMJ	Other Journals
Political power	9	8
Government-industry relationship	20	10
Federal government purchases	4	2
Industry size (number of organizations)	12	7
Typical size of organizations	26	9
Industry concentration (concentrated vs fragmented)	29	17

continues on following page

Table 2. Continued

Industry Characteristics	Number of supporting publications	
	ASQ, AMR or AMJ	Other Journals
Market uncertainty/risk	26	7
Supply chain (sourcing practices)	15	8
Distribution of resources (homogeneous or heterogeneous)	12	6
Industry players (number of competitors with similar power)	20	8
Degree of competition vs cooperation	28	8
Stages in an industry life cycle	16	7
Structure (degree of robustness)	14	8
Dynamism/Stability	21	15
Customers (types, requirements, and needs)	20	3
Entry barriers	20	19
Rates and types of innovation	16	12
Product differentiation (standardized vs differentiated)	32	13
Nature of product (only goods, mainly goods, long lasting)	18	8
Frequency of introducing new product/service	18	9
Capital Intensiveness - Average required investment (fixed)	28	14
Return on Investment (ROI)	18	8
Financial structure (average debt to equity ratio)	10	4
Asset specificity (sunkness vs fungible)	9	2
Price range (price per product and pricing strategy)	12	5
Growth/sales	36	15
Excess capacity vs scarcity	8	2
Specialized human asset intensiveness	12	3
Regulatory environment and coercive pressures	19	6
Culture (common practice, value)	11	4
Technology	30	8
Frequency of inventing new technology	19	7
Level of technological uncertainty	24	7
Munificence/profitability	19	11
Availability of financial resources	4	2
Industry acquisition density	2	4
R&D intensity	4	5
Manufacturing intensity	3	3
Advertising intensity	6	6
Market size	8	5
Strong outside forces	2	5
Demand instability	8	5
Return on assets (ROA)	5	4

continues on following page

Table 2. Continued

Industry Characteristics	Number of supporting publications	
	ASQ, AMR or AMJ	Other Journals
Staff combination (female proportion, part-timers, ...)	3	3
Excitement/interest	2	0
Asymmetry between firms	0	1
Industry complexity	4	6

Source: Prepared for this study.

Modeling Industries' Influential Features

The detailed discussions in the previous sections of this paper can be summarized in the following table, which illustrate ten industry-related propositions.

Table 3. Industry Characteristics, their Categories, and related Propositions.

Industry Characteristics	Categories of Features	Related Propositions
Government and industry relationship	Legislations	P1
Regulatory environment		
Outside forces		
Political powers in industry		
Entry barriers to industry	Establishment	P2
Capital intensiveness		
Availability of financial resources		
Typical size of organizations in industry		
Impact of industry structure		
Federal government purchases		
Financial structure of industry	Financial Inputs	P3
Asset specificity		
Supply chain	Supply	P4
Resource distribution of industry		
Industry players		
Technological level of an industry	Technology	P5
Frequency of inventing new technology		
Research and development intensity		
Innovation types and rates		
Industry complexity		

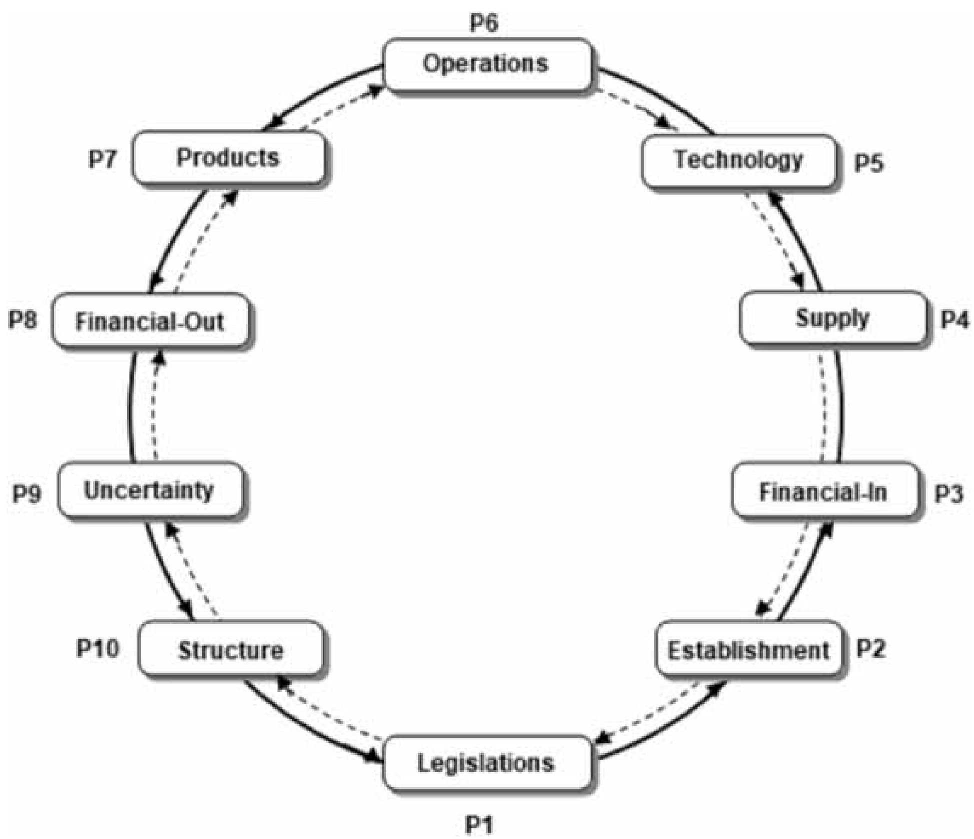
continues on following page

Table 3. Continued

Industry Characteristics	Categories of Features	Related Propositions
Manufacturing intensity	Operations	P6
Typical excess capacity		
Industry concentration		
Organizations asymmetry of industry		
Product differentiation	Products	P7
Nature of product		
Acquisition density of industry		
Frequency of introducing new product/service		
Market size of industry	Financial Outputs	P8
Growth of the industry		
Return on assets (ROA)		
Return on Investment (ROI)		
Profitability of industry		
Price range in industry		
Market uncertainty of industry	Uncertainty	P9
Level of technological uncertainty		
Industry dynamism		
Demand instability of industry		
Degree of competition		
Industry size	Structure	P10
Typical customers of industry		
Culture of industry		
Advertising intensity		
Specialized human asset intensiveness		
Staff combination of industry		
Stages in an industry life cycle		
Excitement of industry		

Based on the systematic literature review, 47 influential factors were identified that shape any industry. These are arranged into ten groups based on the logical connectivity between them. The ten sets of industry makers that are represented by ten propositions have some interface with each other (see figure 1). In connecting the building blocks of an industry, it is common sense to assume that the element of *legislations* can be considered as the potential starting point. Industry-centered legislations define the boundaries of an industry and the activities that are allowed or mandatory in that industry. *Establishment* can be formed based on the legislations. The *financial inputs* to an industry are directed by the requirements defined in the establishment. The amount and type of financial inputs indicates the extent and quality of *supply* in the industry. *Technology* is one of the factors that is expected to be supplied. Technology can also increase the efficiency of the supply in the industry. *Operations* in any industry depend on required technology as well as the effective supply. *Products* are intended outputs of operations. Exchange of the industry's products with money or other valuables would shape the typical *financial outputs* in the industry. Good financial outputs would help organizations in the industry to deal with many if not all forms of *uncertainty* that are unavoidable. The extent of uncertainty is one of the contributors to forming the industry's *structure*. The structure of an industry is an important determinant of the types of legislations that may be required to govern an industry. The reverse impact with less strength in form of feedback can be expected among these ten sets.

Figure 1. Industry's Building Blocks and the Research Proposals.



The analysis illustrates the relatively strong impacts of the industry features on the performance of its organizations. There is a two-way influence between an industry and the organizations because the industry is shaped by its organizations and their common features. Thus, the effect of an industry on its organizations is much stronger than the impact of each of the organizations that form that industry (see figure 2). The *Ten Forces Framework* is shaped by the ten sets of factors.

There are three schools of thought concerning strategizing and organizational performance: resource-based view (RBV), industry-based view, and institutional-based view. Resource-based view focuses only on the inside of an organization (Barney, 1991). It is based on the assumption that situation and quality of inner-organizational resources and capabilities should be considered as the prime determinants of an

Figure 2. Interactivity Among organizations and Industry (Ten Forces Framework).

organization's strategic performance (Wernerfelt, 1984). From the RBV point of view, managers have control over only the inter-organizational factors and these factors are the most direct and strongest contributors to the outputs of an organization (Barney, 1991). Hence, the internal environment of an organization should be considered and analyzed as part of the process of strategizing or performance management.

Unlike RBV, the industry-based view considers industry forces outside of an organization. The assumption is that what makes or breaks an organization is not internal, but comes from the external factors shaping the industry, of which an organization is the only member (Porter, 1980). According to the industry-based view, industry analysis is a crucial element in any proper strategy and performance management (Hrebiniak and Snow, 1980; Pfeffer and Leblebici, 1973; Porter, 1980).

The institutional-based view highlights the importance of outer-organizational institutions such as governments or communities on supporting or undermining the strategizing activities or performance of an organization (Peng, 2009). The institutional-based view goes beyond industry features and considers the effects of some but not all of the macro-environment factors on organizations. This view encourages organizations to monitor and analyze the macro-environment in general and the institutional factors in particular as part of the strategizing activities and output handling.

Figure 3. Macro-Environment, Industry, and Organization (MIO) Model.

By considering the institutional-based view, industry-based view, and resource-based view, it appears that an organization's strategy formulation, strategy implementation, performance, success or failure are affected noticeably by the macro-environmental conditions, industry forces, and inner-organizational factors respectively. The macro-environment, industry, and organization (MIO) analysis technique is a three-layered comprehensive model for analyzing influential factors on an organization's strategizing and performance (see figure 3). The main but not the whole elements of a macro-environment can be technological, environmental, legal, economic, political, and social factors (Bitektine & Haack, 2015; Hambrick & Abrahamson, 1995). Although conducting a complete analysis by using the MIO analysis technique can be time-consuming, complicated and expensive, it gives a full view of everything of matter for the organization.

FUNCTIONS AND FUTURE RESEARCH

Potential Functions of the Ten Forces Framework and MIO Model

The Ten Forces Framework and the macro-environment, industry, and organization (MIO) model have empirical and theoretical functions, so they can be used by practitioners and academics. The Ten Forces Framework can be deployed by executives when the industry factors are considered as highly influential in a particular period such as the birth or decline stage of an industry. Otherwise, the MIO model is a more suitable analysis technique because it includes the Ten Forces as well as inner-organization and macro-environment factors. Managers may employ the MIO Model as the first step in the process of strategizing and performance management in their organizations. It will provide the full information about all influential factors in formulating and implementing strategies as well as leading the organization's performance. Managers would be able to make the most appropriate decision and take the most effective actions based on the wealth of data compiled by the MIO model.

From an academic point of view, the MIO model as well as the Ten Forces Framework can be considered as the theoretical frameworks capable of mapping the performance determinants and their interactions. These models can be used for single or comparative analysis of one or more organizations from one or more industries in the context of one or more countries. The MIO model can help to measure which of the factors in any of the three levels can be more influential in a particular industry or country in a particular period.

Contributions and Limitations

In terms of contributions, this research for the first time identifies 47 influential factors or features that form any industry. It provides the most comprehensive list of industry-makers. Furthermore, the research proposes ten sets of industry characteristics based on the systematic grouping of these 47 factors. Thus, it can be argued that ten major forces shape and manage every industry. In comparison to Porter's Five Forces with 25 factors, the developed theoretical framework in this investigation with ten forces and 47 factors is more detailed and realistic.

This study has its own limitations. The major limitation is its theoretical nature; it is also based on a literature review rather than primary data. The findings could have more pragmatic relevance if the suggested frameworks (*MIO Model* and *Ten Forces Framework*) had been tested in the real world. Also, comparing previous studies based on different methodologies and assumptions in different countries and periods may encounter some epistemological and ontological constraints. The researcher minimized these by focusing on the industry features only, rather than merging or comparing the quantitative outputs of the studies.

CONCLUSION

The research concludes that all industries are built with the same building-blocks or factors. The differences in the intensity of these building factors would separate industries from each other. Numerous studies have shown the positive or negative effects of industry or sector-related factors on either formulating or executing strategies in every industry. The extent to which an industry's characteristics influence strategizing depends on many factors one of which is the intensity of these industry features. The literature also indicates that organizations that shape the industry would also to some extent contribute to influence the industry and its features.

As a result of a systematic approach to reviewing existing literature, 47 factors are identified that shape the features and building blocks of any industry. Some of these elements are very general and others are very specific and can be considered as sub-elements of more general elements. In fact, these factors are partially or completely interrelated.

These 47 factors would shape ten groups of industry features based on the degree of similarities and connectivity among elements of each group. The ten sets of industry factors are *Technology* (Technological level of an industry, frequency of inventing new technology, research and development intensity, innovation types and rates, industry complexity), *legislations* (government and industry relationship, regulatory environment, outside forces, political powers in industry), *uncertainty* (market uncertainty of industry, level of technological uncertainty, industry dynamism, demand instability of industry, degree of competition), *financial outputs* (market size of industry, growth of the industry, return on assets, return on investment, profitability of industry, price range in industry), *financial inputs* (financial structure of industry, asset specificity), *establishment* (entry barriers to industry, capital intensiveness, availability of financial resources, typical size of organizations in industry, impact of industry structure, federal government purchases), *supply* (supply chain, resource distribution of industry, industry players), *products* (product differentiation, nature of product, acquisition density of industry, frequency of introducing new product/service), *structure* (industry size, typical customers of industry, culture of industry, advertising intensity, specialized human asset intensiveness, staff combination of industry, stages in an industry life cycle, excitement of industry), and *operations* (manufacturing intensity, typical excess capacity, industry concentration, organizations' asymmetry of industry).

Two interrelated theoretical frameworks, the Ten Forces Framework and the macro-environment, industry, and organization (MIO) model are emerged as a result of systematic grouping of the identified industry and macro-environment factors.

REFERENCES

Aalbers, R., & Dolfsma, W. (2014). Innovation despite reorganization. *The Journal of Business Strategy*, *35*(3), 18–25. doi:10.1108/JBS-06-2013-0046

Aboutalebi, R. (2016). Strategies for effective worldwide supply chains. In B. Christiansen (Ed.), *Handbook of research on global supply chain management* (pp. 1–14). IGI Global. doi:10.4018/978-1-4666-9639-6.ch001

Aboutalebi, R. (2017). The taxonomy of international manufacturing strategies. In L. Brennan & A. Vecchi (Eds.), *International manufacturing strategy in a time of great flux* (pp. 17–41). Springer. doi:10.1007/978-3-319-25351-0_2

Aboutalebi, R., & Tan, H. (2014). A Hybrid Model for International Strategy Implementation. In *56th annual conference of AIB: International Business, Local Contexts in Global Business*. Beedie School of Business, Simon Fraser University.

Ackerman, R. W. (1970). Influence of Integration and Diversity on the Investment Process. *Administrative Science Quarterly*, *15*(3), 341–351. doi:10.2307/2391624

Agarwal, R., Sarkar, M., & Echambadi, R. (2002). The Conditioning Effect of Time on Firm Survival: An Industry Life Cycle Approach. *Academy of Management Journal*, *45*(5), 971–994.

Anderson, J., & Vakulenko, M. (2014). Upwardly mobile. *Business Strategy Review*, *25*(4), 34–39. doi:10.1111/j.1467-8616.2014.01118.x

Argyres, N., Bigelow, L., & Nickerson, J. A. (2015). Dominant designs, innovation shocks, and follower's dilemma. *Strategic Management Journal*, *36*(2), 216–234. doi:10.1002mj.2207

Arthur, M. M. (2003). Share Price Reactions to Work-family Initiatives: An Institutional Perspective. *Academy of Management Journal*, *46*(4), 497–505.

Bai, C., & Sarkis, J. (2014). Determining and applying sustainable supplier key performance indicators. *Supply Chain Management*, *19*(3), 275–291. doi:10.1108/SCM-12-2013-0441

Bain, J. S. (1968). *Industrial organization* (2nd ed.). Hoboken, NJ: Wiley.

Barabasi, A. L. (2002). Linked: The new science of networks. New York City: Perseus Press.

Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. doi:10.1177/014920639101700108

Bitektine, A., & Haack, P. (2015). The 'macro' and the 'micro' of legitimacy: Toward a multilevel theory of the legitimacy process. *Academy of Management Review*, *40*(1), 49–75. doi:10.5465/amr.2013.0318

Boland, A., Cherry, M. G., & Dickson, R. (Eds.). (2013). Doing a systematic review: A student's guide. New York: Sage Publications.

Bourgeois, L. III, & Eisenhardt, K. (1988). Strategic decision processes in high velocity environments: Four cases in the microcomputer industry. *Management Science*, *34*(7), 816–835. doi:10.1287/mnsc.34.7.816

Brauer, M. F., & Schmidt, S. M. (2006). Exploring strategy implementation consistency over time: The moderating effects of industry velocity and firm performance. *The Journal of Management and Governance*, *10*(2), 205–226. doi:10.100710997-006-0002-2

Brauer, M. F., & Wiersema, M. F. (2012). Industry Divestiture Waves: How a firm's position influences investor returns. *Academy of Management Journal*, *55*(6), 1472–1492. doi:10.5465/amj.2010.1099

Buiren, K. V., Veld, D. & Voort, J. V. D. (2019) State Aid and Competition: Application of Social Welfare Criterion to State Aid. *Journal of Industry, Competition and Trade*, *19*(1).

Cannon, A. R., & John, C. H. S. (2007). Measuring environmental complexity: A theoretical and empirical assessment. *Organizational Research Methods*, *10*(2), 296–321. doi:10.1177/1094428106291058

Castrogiovanni, G. J. (1991). Environmental munificence: A theoretical assessment. *Academy of Management Review*, *16*(3), 452–565.

Castrogiovanni, G. J. (2002). Organization task environments: Have they changed fundamentally over time? *Journal of Management*, *28*(2), 129–150. doi:10.1177/014920630202800201

Caves, R., Fortunato, M., & Chemawat, P. (1984). The decline of dominant firms: 1905-1929. *The Quarterly Journal of Economics*, *99*(3), 523–546. doi:10.2307/1885963

Chadwick, C., Super, J. F., & Kwon, K. (2015). Resource orchestration in practice: CEO emphasis on SHRM, commitment-based HR systems, and firm performance. *Strategic Management Journal*, *36*(3), 360–376. doi:10.1002mj.2217

Chandler, A. (1977). *The visible hand*. Belknap Press of Harvard University Press.

Chandler, A. (1990). *Scale and Scope*. Belknap Press of Harvard University Press.

Chang, J. S., & Chang, W. H. (2014). Analysis of fraudulent behavior strategies in online auctions for detecting latent fraudsters. *Electronic Commerce Research and Applications*, *13*(2), 79–97. doi:10.1016/j.elerap.2013.10.004

Chang, S. J., & Wu, B. (2014). Institutional barriers and industry dynamics. *Strategic Management Journal*, *35*(8), 1103–1123. doi:10.1002mj.2152

Chatain, O. (2014). How do strategic factor markets respond to rivalry in the product market? *Strategic Management Journal*, *35*(13), 1952–1971. doi:10.1002mj.2188

Chatman, J. A., & Jehn, K. A. (1994). Assessing the Relationship between Industry Characteristics and Organizational Culture: How different can you be? *Academy of Management Journal*, *37*(3), 522–553. doi:10.5465/256699

Chen, M., & Hambrick, D. (1995). Speed, stealth and selective attack: How small firms differ from large firms in competitive behavior. *Academy of Management Journal*, *38*(2), 453–482. doi:10.5465/256688

Cherif, E., & Grant, D. (2014). Analysis of e-business models in real estate. *Electronic Commerce Research*, *14*(1), 25–50. doi:10.100710660-013-9126-z

Child, I. (1977). Organization design and performance: Contingency theory and beyond. *Organization and Administrative Sciences*, *8*, 169–183.

Child, J. (1972). Organizational structure, environment and performance: The role of strategic choice. *Sociology*, *6*(1), 1–22. doi:10.1177/003803857200600101

College Dictionary. (2010). Random House Kernerman Webster's College Dictionary. K Dictionaries Ltd. Random House, Inc.

Collins English Dictionary. (2012). *Collins English Dictionary: Complete and Unabridged*. HarperCollins Publishers.

Cornelissen, J. P., Durand, R., Fiss, P. C., Lammercs, J. C., & Varra, E. (2015). Putting communication front and center in institutional theory and analysis. *Academy of Management Review*, *40*(1), 10–27. doi:10.5465/amr.2014.0381

Curty, R. G., & Zhang, P. (2013). Website features that gave rise to social commerce: A historical analysis. *Electronic Commerce Research and Applications*, *12*(4), 260–279. doi:10.1016/j.elerap.2013.04.001

Datta, D. K., Guthrie, J. P., & Rajagopalan, N. (2002). Different industries, different CEOs? An empirical study of CEO career specialization. *Human Resource Planning*, *25*, 14–25.

Datta, D. K., Guthrie, J. P., & Wright, P. M. (2005). Human Resource Management and Labor Productivity: Does Industry Matter? *Academy of Management Journal*, *48*(1), 135–145. doi:10.5465/amj.2005.15993158

Dean, J. W. Jr, & Bowen, D. E. (1994). Management Theory and Total Quality: Improving Research and Practice through Theory Development. *Academy of Management Review*, *19*(3), 392–418. doi:10.5465/amr.1994.9412271803

Dearlove, D., & Crainer, S. (2014). Mobilising value: The turkcell way. *Business Strategy Review*, *25*(1), 38–44. doi:10.1111/j.1467-8616.2014.01026.x

Den Hertog, C. (2014). Better value chains: A matrix for competitive advantage. *The Journal of Business Strategy*, *35*(5), 43–48. doi:10.1108/JBS-04-2014-0042

Dess, G. G., & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative Science Quarterly*, *29*(1), 52–73. doi:10.2307/2393080

Dewar, R. D., & Dutton, J. E. (1986). The adoption of radical and incremental innovations: An empirical analysis. *Management Science*, *32*(11), 1422–1433. doi:10.1287/mnsc.32.11.1422

Doan, T. T., Sahib, P. R., & Van Witteloostuijn, A. (2018). Lessons from the flipside: How do acquirers learn from divestitures to complete acquisitions? *Long Range Planning*, *51*(X), 252–266. doi:10.1016/j.lrp.2018.01.002

Dobni, C. B., Klassen, M., & Nelson, W. T. (2015). Innovation strategy in the US: Top executives offer their views. *The Journal of Business Strategy*, *36*(1), 3–13. doi:10.1108/JBS-12-2013-0115

Ellero, A., & Pellegrini, P. (2014). Are traditional forecasting models suitable for hotels in Italian cities? *International Journal of Contemporary Hospitality Management*, *26*(3), 383–400. doi:10.1108/IJCHM-02-2013-0107

Epstein, M. J., Buhovac, A. R., & Yuthas, K. (2015). Managing social, environmental and financial performance simultaneously. *Long Range Planning*, *48*(1), 35–45. doi:10.1016/j.lrp.2012.11.001

Feinberg, S. E., & Gupta, A. K. (2009). MNC Subsidiaries and Country Risk: Internalization as a Safeguard against weak external institutions. *Academy of Management Journal*, *52*(2), 381–399. doi:10.5465/amj.2009.37315470

Ferrier, W. J. (2001). Navigating the Competitive Landscape: The drivers and consequences of competitive aggressiveness. *Academy of Management Journal*, *44*(4), 858–877.

Ferrier, W. J., Smith, K. G., & Grimm, C. M. (1999). The Role of Competitive Action in Market Share Erosion and Industry Dethronement: A Study of Industry Leaders and Challengers. *Academy of Management Journal*, *42*(4), 372–388.

Flanagin, A., Metzger, M., Pure, R., Markov, A., & Hartsell, E. (2014). Mitigating risk in ecommerce transactions: Perceptions of information credibility and the role of user-generated ratings in product quality and purchase intention. *Electronic Commerce Research*, *14*(1), 1–23. doi:10.100710660-014-9139-2

Fosfuri, A., Lanzolla, G., & Suarez, F. F. (2013). Entry-timing strategies: The road ahead. *Long Range Planning*, *46*(4-5), 300–311. doi:10.1016/j.lrp.2013.07.001

Fredrickson, J. W., Hambrick, D. C., & Baumrin, S. (1988). A Model of CEO Dismissal. *Academy of Management Review*, *13*(2), 255–270. doi:10.5465/amr.1988.4306882

Fremeth, A. R., & Shaver, J. M. (2014). Strategic rationale for responding to extra-jurisdictional regulation: Evidence from firm adoption of renewable power in the US. *Strategic Management Journal*, *35*(5), 629–651. doi:10.1002mj.2118

Friesl, M., & Silberzahn, R. (2012). Challenges in Establishing Global Collaboration: Temporal, Strategic and Operational Decoupling. *Long Range Planning*, *45*(2-3), 160–181. doi:10.1016/j.lrp.2011.11.004

Gagliardi, P. (1986). The creation and change of organizational cultures: A conceptual framework. *Organization Studies*, *7*(2), 117–134. doi:10.1177/017084068600700203

Galbraith, J. R., & Kazanjian, R. K. (1986). *Strategy implementation: structure, systems, and process*. West publishing.

Ganco, M., & Agarwal, R. (2009). Performance Differentials between Diversifying Entrants and entrepreneurial Start-ups: A Complexity Approach. *Academy of Management Review*, *34*(2), 228–252. doi:10.5465/amr.2009.36982618

Garcia, M. U., Cortes, C., Marco-Lajara, B., & Zaragoza-Saez, P. (2014). Strategy, training and performance fit. *International Journal of Hospitality Management*, *42*(1), 100–116. doi:10.1016/j.ijhm.2014.06.001

Garud, R., Jain, S., & Kumaraswamy, A. (2002). Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java. *Academy of Management Journal*, *45*, 196–214.

Getz, K. A. (1997). Research in corporate political action: Integration and assessment. *Business & Society*, *36*(1), 32–72. doi:10.1177/000765039703600103

Goll, I., & Rasheed, A. A. (2005). The relationships between top management demographic characteristics, rational decision making, environmental munificence, and firm performance. *Organization Studies*, *27*(6), 999–1024. doi:10.1177/0170840605053538

Gordon, G. G. (1991). Industry Determinants of Organizational Culture. *Academy of Management Review*, *16*(2), 396–415. doi:10.5465/amr.1991.4278959

Gras, D. & Krause, R. (2019) When does it pay to stand out as stand-up? Competitive contingencies in the corporate social performance–corporate financial performance relationship. *Strategic Organization*, *17*(1).

Gratton, L. (2014). What a corporation can be. *Business Strategy Review*, *25*(2), 10–15. doi:10.1111/j.1467-8616.2014.01046.x

Griffiths, A., & Zammuto, R. F. (2005). Institutional Governance Systems and Variations in National Competitive Advantage: An Integrative Framework. *Academy of Management Review*, *30*(4), 823–842. doi:10.5465/amr.2005.18378880

Grossman, R. S. (2014). *Wrong: nine economic policy disasters and what we can learn from them*. Oxford University Press.

Gual, J., & Mas, N. (2011). Industry Characteristics and Anti-Competitive Behavior: Evidence from the European Commission's Decisions. *Review of Industrial Organization*, *39*(3), 207–230. doi:10.100711151-011-9290-z

Gupta, A. K., & Govindarajan, V. (1984). Business Unit Strategy, Managerial Characteristics, and Business Unit Effectiveness at Strategy Implementation. *Academy of Management Journal*, *27*(1), 25–41.

Hambrick, D. C. (1983). An empirical typology of mature industrial product environments. *Academy of Management Journal*, *26*, 213–230.

Hambrick, D. C., & Abrahamson, E. (1995). Assessing Managerial Discretion Across Industries: A Multimethod Approach. *Academy of Management Journal*, *38*(5), 1427–1441.

Hambrick, D. C., & Finkelstein, S. (1987). Managerial discretion: A bridge between polar views on organizations. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 9, pp. 369–406). JAI Press.

Hathroubi, S., Peypoch, N., & Robinot, E. (2014). Technical efficiency and environmental management: The Tunisian case. *Journal of Hospitality and Tourism Management*, *21*(1), 27–33. doi:10.1016/j.jhtm.2014.03.002

Hetzel, R. (2014). *The great recession: market failure or policy failure?* Cambridge University Press.

Hillman, A., & Hitt, M. (1999). Corporate political strategy formulation: A model of approach, participation and strategy decisions. *Academy of Management Review*, *24*(4), 825–842. doi:10.5465/amr.1999.2553256

Hillman, A., & Keim, C. (1995). International variation in the business-government interface: Institutional and organizational considerations. *Academy of Management Review*, *20*(1), 193–214. doi:10.5465/amr.1995.9503272003

Hillman, A. J., Keim, G. D., & Schuler, D. (2004). Corporate political activity: A review and research agenda. *Journal of Management*, *30*(6), 837–857. doi:10.1016/j.jm.2004.06.003

Hrebiniak, L. G., & Snow, C. C. (1980). Industry Differences in Environmental uncertainty and organizational characteristics related to uncertainty. *Academy of Management Journal*, *23*(4), 750–759.

Huang, S. L. (2014). The impact of context on display ad effectiveness: Automatic attitude activation and applicability. *Electronic Commerce Research and Applications*, *13*(5), 341–354. doi:10.1016/j.elerap.2014.06.006

ISIC. (2008). International Standard Industrial Classification of all Economic Activities (ISIC). United Nations, Department of Economic and Social Affairs, Statistics Division. New York: United Nations.

Jain, A. K., & Singal, A. K. (2014). Mapping vulnerability: How emerging markets respond to multinationals. *The Journal of Business Strategy*, *35*(6), 41–48. doi:10.1108/JBS-11-2013-0112

Jang, J., Kim, S., Lee, Y., & Kim, J. (2013). The effects of relationship benefit on relationship quality and store loyalty from convergence environments—NPS analysis and moderating effects. *Electronic Commerce Research*, *13*(3), 291–315. doi:10.100710660-013-9117-0

Jani, D., & Han, H. (2013). Personality, social comparison, consumption emotions, satisfaction, and behavioral intentions: How do these and other factors relate in a hotel setting? *International Journal of Contemporary Hospitality Management*, *25*(7), 970–993. doi:10.1108/IJCHM-10-2012-0183

Jelassi, T., Enders, A., & Martinez-Lopez, F. J. (2014). *Strategies for e-business: creating value through electronic and mobile commerce concepts and cases*. Prentice Hall.

Jenkins, M. (2014). Innovate or imitate? the role of collective beliefs in competences in competing firms. *Long Range Planning*, *47*(4), 173–185. doi:10.1016/j.lrp.2013.04.001

Katila, R., & Shane, S. (2005). When does Lack of Resources Make New Firms Innovative. *Academy of Management Journal*, *48*(5), 814–829. doi:10.5465/amj.2005.18803924

Katz, D., & Kahn, R. L. (1966). *The social psychology of organizations*. Wiley.

Katz, M. L. (2019). Platform ecomomics and antitrust enforcement: A little knowlwdw is a dangerous thing. *Journal of Economics & Management Strategy*, *28*(1), 138–152. doi:10.1111/jems.12304

Khamseh, H. M., & Nasiriyar, M. (2014). Avoiding alliance myopia: Forging learning outcomes for long-term success. *The Journal of Business Strategy*, *35*(4), 37–44. doi:10.1108/JBS-10-2013-0099

Kinal, T. S. (2013). A recipe for change: Management unleashed. *Business Strategy Review*, *24*(4), 68–71. doi:10.1111/j.1467-8616.2013.01005.x

Kleinbaum, A. M. (2012). Organizational Misfits and the Origins of Brokerage in Intrafirm Networks. *Administrative Science Quarterly*, *57*(3), 407–452. doi:10.1177/0001839212461141

Koch, J. V. (1974). *Industrial Organization and Prices*. Prentice Hall.

Lantz, B., & Hjort, K. (2013). Real e-customer behavioural responses to free delivery and free returns. *Electronic Commerce Research*, *13*(2), 183–198. doi:10.100710660-013-9125-0

Lawrence, P. R., & Lorsch, J. W. (1967a). Differentiation and integration in complex organizations. *Administrative Science Quarterly*, *12*(1), 1–47. doi:10.2307/2391211

Lenz, R. T. (1981). "Determinants" of organizational performance: An interdisciplinary review. *Strategic Management Journal*, *2*(2), 131–154. doi:10.1002mj.4250020204

Loury, G. C. (1979). Market structure and innovation. *The Quarterly Journal of Economics*, *93*(3), 395–410. doi:10.2307/1883165

MacKay, R. B., & Chia, R. (2013). Choice, change, and unintended consequences in strategic change: A process understanding of the rise and fall of Northco Automotive. *Academy of Management Journal*, *56*(1), 208–230. doi:10.5465/amj.2010.0734

Majumdar, S. K., Moussawi, R., & Yaylacicegi, U. (2018). Capital Structure and Mergers: Retroperspev-tive evidence from a natural experiment. *Journal of Industry, Competition and Trade*, *18*(1), 449–472. doi:10.100710842-017-0266-z

Malhotra, N., & Hinings, C. R. (2015). Unpacking continuity and change as a process of organizational transformation. *Long Range Planning*, *48*(1), 1–22. doi:10.1016/j.lrp.2013.08.012

Martin, E. F. Jr, & To, W. M. (2013). Effect of internal market orientation on organizational performance: The case of Macao's gaming industry. *International Journal of Hospitality & Tourism Administration*, *14*(3), 233–254. doi:10.1080/15256480.2013.809980

McAfee, R. P., Mialon, H. M., & Williams, M. A. (2004). What is a barrier to entry? *The American Economic Review*, *94*(2), 461–465. doi:10.1257/0002828041302235

McGahan, A. M., Argyres, N., & Baum, J. A. C. (2004), Context, Technology and Strategy- Forging new Perspectives on the Industry Life Cycle. In Business Strategy over the Industry Lifecycle. Emerald Group Publishing Limited.

McGahan, A. M., & Porter, M. E. (1997). How Much Does Industry Matter, Really? *Strategic Management Journal*, *18*(S1), 15–30. doi:10.1002/(SICI)1097-0266(199707)18:1+<15::AID-SMJ916>3.0.CO;2-1

McNamara, G., & Bromiley, P. (1997). Decision Making in an Organizational Setting: Cognitive and Organizational Influences on Risk Assessment in Commercial Lending. *Academy of Management Journal*, *40*(5), 1063–1088.

McNamara, G. M., Haleblian, J., & Dykes, B. J. (2008). The Performance Implications of Participat-ing in an Acquisition wave: Early mover advantages, bandwagon effects, and the moderating influence of industry characteristics and acquirer tactics. *Academy of Management Journal*, *51*(1), 113–130. doi:10.5465/amj.2008.30755057

Miller, D., & Ghen, M. (1994). Sources and consequences of competitive inertia: A study of the U.S. airline industry. *Administrative Science Quarterly*, *39*(1), 1–23. doi:10.2307/2393492

Miller, K. D., & Bromiley, P. (1990). Strategic Risk and Corporate Performance: An Analysis of Alter-native Risk Measures. *Academy of Management Journal*, *33*(4), 756–779.

Monin, P., Noorderhaven, N., Varra, E., & Kroon, D. (2013). Giving sense to and making sense of justice in postmerger integration. *Academy of Management Journal*, *56*(1), 256–284. doi:10.5465/amj.2010.0727

Moreira, S., Markus, A., & Laursen, K. (2018). Knowledge diversity and coordination: The effect of intrafirm inventor task networks on absorption speed. *Strategic Management Journal*, *39*(9), 2517–2546. doi:10.1002mj.2914

Mount, D. J. (2013). Putting the Dollar signs on quality: The cost of experienced problems in the hotel industry. *International Journal of Hospitality & Tourism Administration*, *14*(1), 87–97. doi:10.1080/15256480.2013.753809

Multilingual Dictionary. (2013). *Kernerman English Multilingual Dictionary*. K Dictionaries Ltd.

Narula, R. (2014). Exploring the paradox of competence-creating subsidiaries: Balancing bandwidth and dispersion in MNEs. *Long Range Planning*, *47*(1-2), 4–15. doi:10.1016/j.lrp.2013.10.006

Nicholson, N. (2013). The invention of leadership. *Business Strategy Review*, *24*(2), 14–29. doi:10.1111/j.1467-8616.2013.00943.x

Oliveira, A. & Gimeno, A. (2014). *Supply Chain Management Strategy: Using SCM to Create Greater Corporate Efficiency and Profits*. Pearson FT Press.

Oliver, C., & Holzinger, I. (2008). The Effectiveness of Strategic Political Management: A Dynamic Capabilities Framework. *Academy of Management Review*, *33*(2), 496–520. doi:10.5465/amr.2008.31193538

Pablo, A. L. (1994). Determinants of Acquisition Integration Level: A Decision-Making Perspective. *Academy of Management Journal*, *37*(4), 803–836.

Pansiri, J. (2014). Tourist motives and destination competitiveness: A gap analysis perspective. *International Journal of Hospitality & Tourism Administration*, *15*(3), 217–247. doi:10.1080/15256480.2014.925718

Park, K., & Jang, S. C. (2014). Hospitality finance and managerial accounting research: Suggesting an interdisciplinary research agenda. *International Journal of Contemporary Hospitality Management*, *26*(5), 751–777. doi:10.1108/IJCHM-12-2013-0554

Paton, R. A., & Wagner, R. (2014). Management education makes a difference: Enhancing German engineering performance. *Long Range Planning*, *47*(5), 277–298. doi:10.1016/j.lrp.2012.06.002

Peng, J., Quan, J., & Zhang, S. (2013). Mobile phone customer retention strategies and Chinese e-commerce. *Electronic Commerce Research and Applications*, *12*(5), 321–327. doi:10.1016/j.elerap.2013.05.002

Peng, M. W. (2009). *Global strategy* (2nd ed.). South-Western Cengage Learning.

Peng, M. W. (2013). *Global Strategic Management* (3rd ed.). South-Western.

Pennings, J. M., Lee, K., & Van, W. A. (1998). Human Capital, Social Capital, and Firm Dissolution. *Academy of Management Journal*, *41*(4), 425–440.

Perez-Franco, R. (2014). Is your supply chain strategy holding back innovation? *Supply Chain Management Review*, (July/August), 8–9.

Perrow, C. (1984). Normal accidents: Living with high-risk technologies. New York: Basic Books.

Pfeffer, J. (1982). Organizations and organization theory. New York: Harper & Row.

Pfeffer, J., & Leblebici, H. (1973). Executive Recruitment and the Development of Interfirm Organizations. *Administrative Science Quarterly*, *18*(4), 449–461. doi:10.2307/2392198

Pfeffer, J., & Salancik, G. R. (1978). The External Control of Organizations: A Resource Dependence Perspective. New York: Harper & Row.

Piskorski, M. J. (2013). Finn Brunton: Spam: A Shadow History of the Internet. *Administrative Science Quarterly*, *59*(3), 29–30. doi:10.1177/0001839213518029

Porter, M. E. (1979). How competitive forces shape strategy. *Harvard Business Review*, (March–April), 21–38. PMID:18271320

Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors. New York: Free Press.

Porter, M. E. (1981). The Contributions of Industrial Organization to Strategic Management. *Academy of Management Review*, *6*(4), 609–620.

Porter, M. E. (2008). The five competitive forces that shape strategy. Cambridge: Harvard Business Review, (January), 78–93. PMID:18271320

Qu, W. G., Pinsonneault, A., & Oh, W. (2011). Influence of Industry Characteristics on Information Technology Outsourcing. *Journal of Management Information Systems*, *27*(4), 99–127. doi:10.2753/MIS0742-1222270404

Randolph, W. A., & Dess, G. G. (1984). The congruence perspective of organization design: A conceptual model and multivariate research approach. *Academy of Management Review*, *9*(1), 114–127. doi:10.5465/amr.1984.4278106

Robinson, K., & McDougall, P. (2001). Entry barriers and new venture performance: A comparison of universal and contingency approaches. *Strategic Management Journal*, *22*(6-7), 659–685. doi:10.1002mj.186

Royer, S. (2012). Strategic management and online selling: creating competitive advantage with intangible web goods. New York City: Routledge.

Rumelt, R. P. (1991). How Much Does Industry Matter? *Strategic Management Journal*, *12*(3), 167–185. doi:10.1002mj.4250120302

Scherer, F. M., & Ross, D. (1990). *Industrial Market Structure and Economic Performance*. Houghton Mifflin.

Schmalensee, R. (1985). Do markets differ much? *The American Economic Review*, *75*, 341–351.

Schoonhoven, C. B. (1981). Problems with contingency theory: Testing assumptions hidden within the language of contingency. *Administrative Science Quarterly*, *26*(3), 349–377. doi:10.2307/2392512 PMID:10252610

Schoonhoven, C. B., & Jelinek, M. (1990). Dynamic tension in innovative, high-technology firms: Managing rapid technological change through organizational structure. In M. A. Von Glinow & S. A. Mohrman (Eds.), *Managing Complexity in High-Technology Organizations*. Oxford University Press.

Schuler, D. A., Rehbein, K., & Cramer, R. D. (2002). Pursuing Strategic Advantage Through Political Means: A Multivariate Approach. *Academy of Management Journal*, *45*(4), 659–672.

Shane, S. (2001). Technology opportunity and firm formation. *Management Science*, *47*(2), 205–220. doi:10.1287/mnsc.47.2.205.9837

Shane, S., & Stuart, T. (2002). Organizational Endowments and the Performance of University Start-ups. *Management Science*, *48*(1), 154–170. doi:10.1287/mnsc.48.1.154.14280

Sharma, S., & Crossler, R. E. (2014). Disclosing too much? Situational factors affecting information disclosure in social commerce environment. *Electronic Commerce Research and Applications*, *13*(5), 305–319. doi:10.1016/j.elerap.2014.06.007

Shen, W., & Cannella, A. A. (2002). Revisiting the Performance Consequences of CEO Succession: The Impacts of Successor Type, Postsuccession Senior Executive Turnover, and Departing CEO Tenure. *Academy of Management Journal*, *45*(4), 717–733.

Sher, M. M., & Kim, S. L. (2014). Supply Chain Coordination with Quantity Discount for Seasonal Demand. *International Journal of Supply Chain Management*, *3*(3), 7–15.

Sheremata, W. A. (2004). Competing through Innovation in Network Markets: Strategies for Challengers. *Academy of Management Review*, *29*(3), 359–377. doi:10.5465/amr.2004.13670986

Sila, I. (2013). Factors affecting the adaptation of B2B e-commerce technologies. *Electronic Commerce Research*, *13*(2), 199–236. doi:10.100710660-013-9110-7

Singh, N., Cranage, D., & Lee, S. (2014). Green strategies for hotels: Estimation of recycling benefits. *International Journal of Hospitality Management*, *43*(1), 13–22. doi:10.1016/j.ijhm.2014.07.006

Singh, U. S., & Mishra, U. S. (2014). Supply Chain Management through Vertical Coordination in Vegetable Industry. *International Journal of Supply Chain Management*, *3*(3), 148–154.

Slack, N., Brandon-Jones, A., & Johnston, R. (2013). *Operations management* (7th ed.). Pearson.

Suarez, F. F., Grodal, S., & Gotsopoulos, A. (2015). Perfect timing? Dominant category, dominant design, and the window of opportunity for firm entry. *Strategic Management Journal*, *36*(3), 437–448. doi:10.1002mj.2225

Sultan, A., & Saurabh, D. (2013). Achieving Sustainable Development through Value Chain. *International Journal of Managing Value and Supply Chains*, *4*(2), 39–46. doi:10.5121/ijmvsc.2013.4204

Sutton, J. (1991). *Sunk Cost and Market Structure: Price Competition, Advertising, and the Evolution of Concentration*. Cambridge: The MIT Press.

Swaminathan, A. (1995). The Proliferation of Specialist Organizations in the American Wine Industry, 1941-1990. *Administrative Science Quarterly*, *40*(4), 653–680. doi:10.2307/2393757

Swoboda, B., Elsner, S., & Morschett, D. (2014). Preferences and performance of international strategies in retail sectors: An empirical study. *Long Range Planning*, *47*(6), 319–336. doi:10.1016/j.lrp.2012.05.002

Teece, D. J. (1980). Economies of scope and the scope of the enterprise. *Journal of Economic Behavior & Organization*, *1*(3), 223–247. doi:10.1016/0167-2681(80)90002-5

Teece, D. J. (1982). Towards an economic theory of the multiproduct firm. *Journal of Economic Behavior & Organization*, *3*(1), 39–63. doi:10.1016/0167-2681(82)90003-8

Teece, D. J. (1993). The dynamics of industrial capitalism: Perspectives on Alfred Chandler's Scale and scope (1990). *Journal of Economic Literature*, *31*, 199–225.

Thompson, J. D. (1967). *Organizations in Action: Social Science Bases of Administrative Theory*. McGraw-Hill.

To, W. M., Martin, E. F. Jr, & Yu, B. T. W. (2015). Effect of management commitment to internal marketing on employee work attitude. *International Journal of Hospitality Management*, *45*(2), 14–21. doi:10.1016/j.ijhm.2014.11.002

Tong, T. W., Reuer, J. J., Tyler, B. B., & Zhang, S. (2015). Host country executives' assessments of international joint ventures and divestitures: An experimental approach. *Strategic Management Journal*, *36*(2), 254–275. doi:10.1002mj.2210

Tripsas, M. (1997). Unrevealing process of creative destruction: Complementary assets and incumbent survival in the typesetter industry. *Strategic Management Journal*, *18*(S1), 119–142. doi:10.1002/(SICI)1097-0266(199707)18:1+<119::AID-SMJ921>3.0.CO;2-0

Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly*, *31*(3), 439–465. doi:10.2307/2392832

Utterback, J. M. (1994). *Mastering the Dynamics of Innovation*. Harvard Business School Press.

Van Witteloostuijn, A., & Boone, C. (2006). A resource-based theory of structure and organizational form. *Academy of Management Review*, *31*(2), 409–426. doi:10.5465/amr.2006.20208688

Wang, R. D., & Shaver, J. M. (2014). Competition-driven repositioning. *Strategic Management Journal*, *35*(11), 1585–1604. doi:10.1002mj.2167

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 52. doi:10.1016/j.lrp.2018.12.001

Watts, D. J. (2003). *Six degrees: The science of a connected age*. Norton.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. doi:10.1002mj.4250050207

Westphal, J. D., & Milton, L. P. (2000). How Experience and Network Ties Affect the Influence of Demographic Minorities on Corporate Boards. *Administrative Science Quarterly*, *45*(2), 366–398. doi:10.2307/2667075

Wibbens, P. D. (2019). Performance persistence in the presence of higher-order resources. *Strategic Management Journal*, *40*(2), 181–202. doi:10.1002mj.2979

Wu, M., Gide, E., & Jewell, R. (2014). The EBS management model: An effective measure of e-commerce satisfaction in SMEs in the service industry from a management perspective. *Electronic Commerce Research*, *14*(1), 71–86. doi:10.100710660-013-9127-y

Yin, X., & Shanley, M. (2008). Industry Determinants of the "Merger versus Alliance" Decision. *Academy of Management Review*, *33*(2), 473–491. doi:10.5465/amr.2008.31193515

Yoffie, D. B., & Kwak, M. (2001). Playing by the rules: How Intel avoids antitrust litigation. *Harvard Business Review*, *79*(6), 119–122. PMID:11408972

Yu, T., Sengul, M., & Lester, R. H. (2008). Misery Loves Company: The Spread of Negative Impacts Resulting from an Organizational Crisis. *Academy of Management Review*, *33*(2), 452–472. doi:10.5465/amr.2008.31193499

Zajac, E. J., & Westphal, J. D. (1996). Who shall succeed? How CEO/board preferences and power affect the choice of new CEOs. *Academy of Management Journal*, *39*, 64–90.

Zammuto, R., & O'Connor, E. (1992). Gaining advanced manufacturing technologies' benefits: The roles of organization design and culture. *Academy of Management Review*, *17*(4), 701–728. doi:10.5465/amr.1992.4279062

Zhu, H., & Chung, C. N. (2014). Portfolios of political ties and business group strategy in emerging economies: Evidence from Taiwan. *Administrative Science Quarterly*, *59*(4), 599–638. doi:10.1177/0001839214545277

Chapter 13
Revisiting Corruption Mathematical Models in the Fourth Industrial Revolution

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ABSTRACT

Analyzing corruption is a topic of interest to many and is indeed very complex due to its inherent difficulties with its identification and quantification. Past studies present several variables, indices, computational models, and approaches, but their relevance in the fourth industrial revolution (Industry 4.0) has been debatable. This chapter addresses the need to revisit the mathematical models and approaches in the Industry 4.0 context. The chapter provides a foundation for this argument through a compressive literature review followed by a proposal of a three-stage concept for corruption identification. The chapter illustrates two case studies from which a strong justification derives for considering the digital transformation and use of big data to deal with corruption and improve the external and internal perceptions about corruption in general.

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INTRODUCTION AND BACKGROUND

Corruption is a very well-known evil that most institutions and governments across the globe need to deal with. The World Bank estimates that more than US$1 trillion annually goes into bribes alone globally, and about US$2.6 trillion get lost in corruption (PWC, 2017; World Bank Group, 2020). The exact figure could possibly be even higher, and this amount does not include costs resulting from non-completion of development projects.

Corruption or fraud may exist in various forms within the societies, organizations, and trade practices internal to a country. Globalization adds another dimension to corruption. Funds that fraudulently earned or embezzled may be diverted to foreign destinations under the pretense of investments in the absence of effective regulation and control mechanisms. Globalization motivates a few countries to open their doors to foreign direct investment (FDI) from wealthy investors by offering attractive incentives and even citizenship; to strengthen their economies.

One of the critical aspects of globalization in middle and low-income countries is the societal advancement towards a liberalized economic environment in tune with specific standards in first-world countries. Integration into the global world allows the free flow of funds in and out of countries, which is the underpinning aspect of economic liberalization. However, this also opens up avenues for corruption. The relationship between corruption and globalization is a widely researched topic (*e.g.,* Dutta, 2018; Leal & Marques, 2021; Pasculli & Ryder, 2019). Due to globalization and economic liberalization, corruption has been altered in how it once existed and was maintained. Many countries have established anti-corruption policies that advocate for trade and information transparency and the right to access information.

Corruption has been labeled the "dreaded nemesis" in various fields such as logistics and procurement (Tukuta & Saruchera, 2015); public finance and tax administration (Antonakas, Giokas & Konstantopoulos, 2013; Hillman, 2004); mining (Knutsen, Kotsadam, Olsen & Wig, 2017); agriculture and land reform (Muranda, Frank & Saruchera, 2014; You, 2014); international or global business (Asongu, 2014; Bahoo, Alon & Paltrinieri, 2020; Zekos, 2004); innovation and national infrastructure development projects management (Gillanders, 2014; Owusu, Chan & Hosseini, 2020; Saruchera, 2014; Saruchera & Phiri, 2016; Tabish & Jha, 2012); education systems (Deliversky, 2016; Frolova, 2014) and in health delivery (Factor & Kang, 2015), including the administration of the global COVID-19 pandemic (Attila, 2020; Al-Zaman, 2020; Mietzner, 2020).

While past studies present several variables, indices, computational models, and approaches to identify and manage corruption, the application of such models in the fourth industrial revolution (Industry 4.0) has been arguable. This chapter addresses the need to revisit the mathematical models and approaches in the context of the fourth industrial revolution based on a systematic review of the literature. The chapter proposes a three-stage concept for corruption identification. The chapter illustrates two case studies from which conclusions and recommendations are drawn given the nature of industry 4.0.

LITERATURE REVIEW

Several researchers have pursued corruption since the early 60s, and a great deal of information is available in literature in this field. This chapter carefully highlights salient issues and provides the foundation for the discussion in a systematic way. This section defines corruption and its effects and considers various determinants of corruption.

Defining Corruption and its Effects

Corruption is considered a flexible vice with no specific form and reflects in various formations or dimensions. Corruption is universally considered crimes committed with common knowledge and carried out by parties in secret. Corruption activities are quite sophisticated, well-structured, and deliberately designed in a coordinated way by the perpetrators involved. The word ‘corruption’ comes from the Latin, ‘‘*corruption’’* which means “breaks our trustworthiness.’’ In essence, the primary meaning of corruption is a lack of integrity or honesty. Others refer to it as dishonest, unethical, dishonest conduct (Hindriks, Muthoo & Keen, 1999). It is an offense of criminal misconduct committed in the discharge of duty through corrupt or illegal means by abusing one`s public or private position only to obtain any valuable or pecuniary advantage (d’Agostino, Dunne & Pieroni, 2016). The Social Science Encyclopedia identifies corruption with bribery, while Mauro (1998 p. 11) distinguishes bribery from corruption and defined bribery as “the practice of tendering and accepting a personal advantage as a reward violation of duty.”

The Oxford Dictionary has defined corruption as the “dishonest or fraudulent conduct by those in power, typically involving bribery.” The dictionary meaning of the word *corruption* is bribery, which means a gift to persons in an office with the object of inducing them to disregard their official duties for the giver’s benefit. The World Bank defined corruption as public office abuse for private gain, and the definition is universally accepted (World Bank Group, 2020). Corruption is thus seen to be an abuse of an official position for one’s personal benefit.

Corruption is regarded as a complex phenomenon and generally unacceptable and unethical. Although it remains debatable that corruption is always a case of self-absorption or self-fascination of one sort or another, a broader range of cases can be placed under the title of corruption, thus making it a more powerful interpretive daily. It is often assumed that corruption occurs only in hidden, occult, and unofficial settings, clandestinely, and with the immediate exchange-partners’ knowledge only (Christensen, 2012). The notion of corruption as something hidden is linked “intrinsically to the concept of transparency, which is a major watchword for policymakers, politicians, and other proponents of modernity” (Sanders, 2003, p.149). Thus, it is crucial to provide an overview of the various forms of corruption persistent in the fourth industrial revolution.

It is common knowledge that corruption reduces the economic competitiveness among organizations in any competitive segment. To a greater extent, the corrupt firms use their financial muscle to influence the market towards their preferred direction. This reduces the business prospects for the competing organization, though equipped with quality operations and experience. In essence, corrupt entities and practices will alter the market rules and inflict losses to others (Dion, 2011). Corruption also increases the market prices because corrupt vendors transfer the bribery costs to the market.

Categorization of Corruption

The World Bank Group (2007) noted various forms of corruption, including bribery, theft, political, isolated and systemic corruption, and bureaucratic corruption. Bribery has been described as the “main tools” form of corruption globally, and it includes issues around government contracts, government benefits, time, licenses, and legal outcome bribes (World Bank Group, 2020). Table 1 shows a few well-known categories (or forms) of corruption.

Table 1. Categories of corruption

Categories of corruption	Description
Bribery	Bribery may take the form of gifts, loans, fees, rewards, or other benefits (e.g., taxes, services, and donations). This category generally results in collusion or extortion. Both collusion and extortion are difficult to detect (or measure) if the proceeds of the bribe are not channeled through the detectable source(s).
Embezzlement	Stealing, misdirecting, or misappropriating funds or assets put in one's confidence or under one's control and power. Legally (in some countries), embezzlement may not involve corruption. Internal and external audits can detect embezzlement in most situations; however, digitalization is the key driver for detection.
Facilitation arrangement/ payment	Another form of a bribe, but vaguely called "speed" or "grease" payment, made to secure approvals or expedite a complex but routine process; for which the person has legal rights.
Fraud	The act of deliberately deceiving someone to achieve an unfair or illegal advantage.
Collusion	Collusion is mostly on the lines of "Quid-pro-que,"; where essentially two (or more) entities will have an arrangement(s) for mutual benefits. This results in all entities indulging in fraudulent and/or illegal actions.
Extortion	The act of impairing or harming, directly or indirectly, any party or the party's property to improperly influence a party's actions. This is a dangerous form of corruption as victims may not be able to voice their situation and incurred losses/ damages. Generally, extortion may involve powerful and well-connected personalities with significant societal influence.
Patronage and nepotism	Support is assumed by a patron and engaging in direct appointments.

Source: World Bank (2011)

Determinants of Corruption

Some of the most critical determinants or causes of corruption include the level of social inequality, political and economic environment, administrative policies, size of the shadow economy, professional ethics, unemployment, regulatory intensity, habits, traditions, institutional and cultural aspects, demography, and so on (Robinson & Acemoglu, 2012; Akhter, 2004; ASongu, 2014). Corruption practices are growing globally (World Bank Group, 2020). Economic researchers refer to some corruption indicators, such as government expenditure, Gross Domestic Product (GDP) per capita, inflation, social welfare, level of foreign aid, and Foreign Direct Investment (FDI), among others, and these indicators can give an idea about the level of corruption (*e.g*., Al-Marhubi, 2000; Ferwerda, Deleanu & Unger, 2017; Welsch, 2008). It should be noted that various causes (or determinants) of corruption are highly inter-related to one another. The sections below systematically explain these causes.

Social Inequality

Social inequality manifests in society as a result of the impact of corruption on economic growth. Given this, various authors opined that some societies' economic activities could be stimulated by corruption (Gillanders, 2014; Golden, 2002; Kovacic, 2005; World Bank 2007; 2020). The argument is further supported by various studies that posit the bidirectional causal relationship between corruption and inequality and its persisted stimulation of inequality in societies. The resultant effect impacts the income distribution, aid in-flows most importantly in transitional economies, among other things. It is further argued that inequality in society remains one of the powerful stimulants of corruption. Golden (2002), Koyuncu and Unver (2017) concluded that the gap between the rich, the bipolar society, and the poor continues to widen and remains one of the major factors stimulating corrupt activities in society. They further argued that the elite society's behavior, who in socio-political theory is considered a small, powerful group, stimulates corruption in society through state capture that may lead to control of national resources by the few. This kind of relationship may lead to the commission of first level corrupt activities that may be equal to bribery, which in principle, are criminal misdemeanors (Golden, 2002; Koyuncu & Unver, 2017).

Literature thus offers different scenarios in which inequality might unintentionally promote corruption. Some studies highlight that the poor are more vulnerable to extortion and less able to hold authorities and elites to account. Uslaner and Rothstein (2014) explain this vulnerability in terms of gender and education levels: Research shows that, in certain circumstances, inequality might foster corruption (Uslaner 2008; Muranda et al., 2014).

Political and Social Environment

Past studies have further documented how the elites can gain protection from the state through legalized practices related to deregulation, transfers of public assets at bargain prices, profitable licenses, permits, or public contracts. Freeland (2012) refers to how political processes help the rich at the expense of the rest of the population as "rent-seeking." Some authors argue that money flow increases corruption opportunities (Alesina & Weder, 2002; Asongu, 2014). Menard and Weill (2016) attempted to unpack the relationship between a country's financial aid and corruption. The authors established that, instead of reducing corruption, aid could foster corruption. Della and Vannucci (2016) chronicle how corruption has been institutionalized in many parts of the world. Basyal, Poudyal, and Seo (2018) identified various indicators of such institutionalized corruption such as E-government development index (EGDI), Economic prosperity (GDPpc), inflation, press freedom, political stability, and level of political violence and the effectiveness of government.

Gillanders (2014) notes that a high dependence on foreign assistance reduces governments' incentives to collect revenues from taxation and be accountable. As a result, aid might not only foster corruption (Menard & Weill, 2016), but it might also decrease the quality of governance. Alesina and Weder (2002) analyzed aid flows and corruption and found no evidence that increased aid could be associated with a decline in corruption.

Higher levels of government expenditures and more regulation naturally invite corruption because they provide the opportunity for government officials to be paid off for regulatory favors, subsidies, and government contracts (Torgler & Piatti, 2013; Holcombe & Boudreaux, 2015). Some countries (for example, Scandinavian countries) have relatively large governments but lower corruption levels (Andersen & Dinesen, 2017; Holcombe & Boudreaux, 2015). While institutional differences may explain some of the cross-country differences in corruption, the most consistent relationship is that high levels of regulation are associated with more corruption (Zekos, 2004; Robinson 1998). When looking at the effect of its formation, structure, and functions, it is mostly considered that it focuses on distributive justice as an institution, which in most cases promotes corruption, in order to meet the needs.

However, it is not the government alone that is considered to stimulate corruption through retributive policies and procedures, but even political institutions in their own making and formations. Needless to say, studies conducted by Kraay, Zoido-Lobaton, and Kaufmann (2002) found a negative relationship that exists between presidential democracy and corruption. They found no relationship between pluralism versus fractional electoral systems in pluralist countries. Meanwhile, Ledrman, Loayza, and Soares (2005) concluded that presidential democracies enjoy more corruption than mixed systems or closed-list parliamentary systems. The comparisons continued with, who concluded that hybrid parliamentary systems have more corruption than closed list parliamentary systems. The author further noted that the presidential system has more corruption levels than proportional represented hybrid systems. However, Welsch (2008) noted that democracy and corruption correlate at the inverted U-shaped curve over time. Therefore, it can be deduced that corruption is a by-product of a country's government intervention in economic affairs, with extensive government and political institutions considered to be more corrupt.

Legal Systems

Legal systems are considered the oil that promotes the wheels of corruption due to their usual lacunas and known deficiencies. Because of these gaps, which the legal systems create with efficiency and effectiveness, corruption persists (La Porta et al., 1999). However, many researchers conclude that the relationship between deficient legal systems and corruption is statistically insignificant. Others believe that federal government systems promote more corruption than unitary government systems like the Republic of China. For instance, Treisman (2000) and Shleifer and Vishny (1993) long suggested that competition between autonomous government structures can accelerate bribes, a form of corruption, and criminal crime in Criminal law in various jurisdictions. This usually produces hard tolls on society, particularly the proletarians. Whilst some authors argue that the British colonial origins are considered to have less corrupt activities, others conclude that the only gift that the British left for Indians in India was indeed, and is still considered to be corruption (Acemoglu & Robinson, 2012; La Porta et al., 1999; Johnson & Robinson, 2006). This point suggests that it is complicated to draw a line between who, what, or which country can be considered less corrupt. This chapter's authors thus conclude that corruption increases with the level of political instability, as evidenced by a few politically motivated violence and terrorism incidents in different parts of the world.

Shadow Economy

Literature suggests that corruption and shadow economy complements each other. Choi and Thum (2005), in their entrepreneurial model, posit underground constraints that reflect a corrupt official's ability to ask for bribes. The model shows that corruption and shadow economy are substitutes because the shadow economy's existence reduces officials' propensity to demand graft. On the contrary, Acemoglu et al. (2006) model corruption and the shadow economy as complements. Hindriks et al. (1999) show that the shadow economy is a complement to corruption. This is because the taxpayer colludes with the inspector and the inspector under-reports the taxpayer's tax liability in exchange for a bribe. This interpretation is in line with the models of Choi and Thum (2005). Shadow economy reduces corruption in high-income countries (substitution effect) and increases corruption in low-income countries (complementary effect). Thus, the authors conclude that the corruption-shadow economy relationship is bi-directional, depending on the country's economic activity and income levels.

Unemployment

It has become common knowledge and belief that higher levels of unemployment lead to higher levels of corruption in various government systems and political institutions globally. Many believe that corruption relates to the misuse of government powers in order to gain personal favors. Corruption, therefore, manifests in situations where government systems are considered weak and compromised by the authorities occupying positions of trust. In this context, the officials negligently or deliberately ignore their duties in lieu of private gains, at the government's expense as an institution entrusted to the position by society. This situation usually persists mainly when a government official in a position of trust accumulates absolute power. This implies that the official will enjoy monopoly power in the exercise of duties. In such situations, the agent ceases to be answerable to anybody, meaning that the agent becomes unaccountable no one in the discharge of duty. So, if one is left to exercise own discretion, this amounts to corrupt activities (Matipira, 2015).

However, the only reason for doing so could be motivated by the corrupt attributes of an individual, which is difficult to quantify. Others would consider attributes like greedy, selfishness, favoritism, and major drivers of such commission of corrupt activities. Dwivendi (1967) concluded that the reasons for the neglect of duty by government officials and or public officers and amounting to corruption are positively correlated to unemployment. Besides, Dwivendi's (1967) findings are substantiated by Bouzid (2016), who also examined the relationship between corruption and employment amongst youth. The two studies concluded that if tax, labor, and corruption are drivers, it increases unemployment in a country. They further concluded that if employment opportunities *ceteris Paribas* in a country and transparency and accountability in labor processes during employment, corruption can be minimal, leading to economic growth. The rationale as a point of departure to this argument is that higher corruption leads to higher unemployment, which manifests into professional labor in the market, shunning employment opportunities that prevails in such economic environments. The resultant effect to this outcome would mean that unemployed professionals would seek employment opportunities elsewhere, initiate their private start-ups, and or enjoys unlawful and unsustainable activities that produce short-term rewards.

The desire of the unemployed professionals to endeavor into those described above would be based on *celebrity association*, a belief that those who got employment are connected to those in power. They abuse their benefits. A study conducted in Kenya by Onchari (2019) also affirms the above argument and concludes that corruption has a long-term influence on unemployment.

Regulatory Policies

This chapter argues that if corruption is grounded on regulations, minimized regulatory government can minimize corruption in practice. Similarly, if corruption leads to more regulation, it then warrants reducing the regulatory provisions that might have been the source of corruption. From a policy perspective, institutions are supposed to secure society and support solidarity. Nationalism can also encourage corruption within developing countries that are multi-ethnic or multi-racism. Businessmen's temptation to engage in questionable behavior - including corruption- can easily dominate all other considerations (Acemoglu et al., 2006). The relationship between government size and corruption incidence appears to be negative (La Porta et al. 1999) or non-existent. This, in turn, raises the demands for redistribution and an increase in government size but then flows back into more corruption. Although corruption theories exist, they remain moot in their application in various institutions in different domains.

Cultural Aspects

It is interesting to note that typical social and cultural practices can fuel corruption in certain countries. Cultural aspects at societal and organizational levels have been some of the extensively studied business science areas. Hofstede (1983) presented four dimensions of culture, popularized by Denison (1990), who linked the dimensions to organizational effectiveness. The variables emanating from these studies have been widely adopted in various studies on the impact of culture on numerous aspects, including; corruption (House et al., 2002; Scholl & Schermuly, 2020), human resource practices (Aycan et al., 2000), innovation (Efrat, 2014), and reverse logistics (Saruchera & Asante-Darko, 2021).

Hofstede (2001) and House et al. (2002) noted that different societal cultures and cultural perspectives often lead to corruption. The authors further noted that values and culture positively correlate with personal human behaviors. Specific cultural differences can thus influence corruption. Therefore, it is essential to conclude that cultural dimensions as independent variables may influence corruption in an organization, impact the country's competitiveness when it comes to international business, and lower foreign direct investments.

Thus, understanding cultural dimensions' effects becomes paramount for any legal persona that seeks business success and improved international competitiveness in business (Park & Khanoi, 2017). There is a general consensus in the literature that national culture is a central factor influencing corruption among countries worldwide (Harris & Davison, 2002; Husted, 2002; Park & Khanoi, 2017). Therefore, it can be concluded that Hofstede studies are paramount in fighting corruption based on understanding a country's specific cultural dimensions that influence the commission or omission of corruption.

Consequences of Corruption

There are several consequences of corruption, and they may include delays of economic development, retarding international trade and investment (Glynn, Kobrin & Naim, 1997). Mauro (1998) notes that such negative impacts often result in negative economic growth. Zhao, Kim, and Du (2003) reiterate that high corruption in a country can adversely impact the much-needed foreign direct investment inflow and hinder economic success. Husted (2002) asserts that high corruption in a country reduces human capital and affects the triple helix in terms of economic development in a country.

Further, business corruption also harms growth in wealthier economies. It is also observed that corruption in business decreases the GDP per capita for a country, particularly in rich countries. An increase in business corruption leads to an increase in regulatory frameworks that govern business operations and subsequently affect an economy's growth.

Corruption also reduces foreign direct and domestic investments, increases inequality and poverty, raises the number of freeloaders (renters, free-riders) in the economy, distorts and exploits public investments, and reduces public revenues. Forms of corruption vary but include bribery, extortion, cronyism, nepotism, parochialism, patronage, influence peddling, graft, and embezzlement. *Corruption* erodes society's trust in *government* and undermines the social contract, which is a significant concern worldwide. Corruption has a disproportionate impact on the poor and most vulnerable, increasing costs and reducing access to services, including health, education, and justice.

Ciocchini, Durban, and Ng (2003) found that countries that are generally corrupt pay premiums to issue out national bonds. It becomes evident that corruption affects productivity, reduces liberal reform policies, relegates them to ineffectiveness, and increases the unofficial sector that violates tax and regulatory laws (Lambsdorff, 2003). Lambsdorff (2003) provided a quantification model that concludes that a unit reduction in corruption results in 4% higher GDP and higher annual capital inflows, making the impact of democracy on corruption difficult to assess (Blake & Martin, 2002).

Openness, accountability, and honesty define government transparency. Transparency is fundamental in that if compromised; it can breed high levels of corruption and promote public officers' resignations, particularly if accountability is compromised (Bauhr, 2016; Chong, 2015). Good and transparent governance are considered integral parts of good government, to the extent of disintegration. However, corruption and secrecy remain contradictory to the progressive growth and utilization of natural resources of a country.

The Relationship Between Globalization and Corruption

The relationship between corruption and globalization is not a direct one. Globalization may alter the balance between corruption costs and benefits (Park & Khanoi, 2017), and thus, indirectly, globalization might affect the level of corruption. Also, globalization shows the integration process of economies through economic, social, and political channels. Lalountas, Manolas, and Vavouras (2011) studied the relationship between corruption, development, and globalization using the data from 127 countries. They observed the adverse economic outcomes of corruption, including private sector reduction, reduced tax revenue, inhibits foreign direct investments, and lower economic development. They concluded that corruption might even weaken the political stability and the democratic space of a country. Furthermore, they noted corruption determinants already alluded to by other scholars like transparency, political instability, and poverty, among other things.

The globalization level of a country affects corruption in various forms. It is important to note that globalization comes in various forms, including economic, social, and political globalization, and these all have a bearing on corruption. Mukherjee (2018) offered a contradicting view on the relationship between trade and corruption using a two-stage technique. The first stage models the trade is modeled in terms of a country's economic globalization, GDP, imports, exports, and land area. The second stage models the corruption in terms of growth and number of telephones, urban population, GDP growth, and years of schooling. In a study of 138 countries, it emerged that the effect of globalization on corruption was insignificant. The study further reveals that high levels of economic development are associated with lower levels of corruption.

However, a study carried out by D'agostino et al. (2016) concluded that corruption has direct and indirect adverse impacts on economic growth. Studies conducted by Mauro (1998), Koyuncu and Unver (2017), and Asiedu and Freeman (2009) posit that corruption shows a negative effect on both private and public investments, thereby reducing the economic growth of a country. On the other hand, Wu et al. (2017) found that corruption negatively impacted the total factor productivity of a country. They further noted that corruption inhibits public infrastructure due to the misallocation of resources and tax revenue losses. To substantiate this premise, Gillanders (2014) revealed that corruption has a negative impact on infrastructure development. On the other hand, in their study, Koyuncu and Unver (2017) found a negative relationship between corruption behavior and tax revenues, whereas Erdogan and Unver (2015 established that corruption has a negative impact on foreign direct investment.

Interestingly, there are a few studies that contradict the majority opinion on corruption and its possible consequences. For instance, Huang (2016) reported on a few possible positive effects. However, it is essential to note that various forms of corruption and one's perception play a significant role in how corruption is defined.

Madanipour and Thompson (2020) have reported on combinational effects of other indicators such as globalization, wealth, democracy, political stability, and legal efficiency on the state of corruption. Interestingly, Leal and Marques (2021) have suggested that there is no strong relation between the indicators related to corruption but indicated the possibilities of new forms of corruption with globalization and economic development. A few authors have undertaken corruption analysis due to national policies and governance structures influenced by globalization. Bellido et al. (2021) and Bahoo et al. (2020) have indicated that there might be a relation between government ideology and the level of perceived corruption. Corruption is related to the globalization and socio-economic development (Bayar, 2020) of any developing country. Thus there is a need to analyze corruption as a factor of national stability and growth indicators. Gründler and Potrafke (2019) suggested a strong relation between globalization, corruption, and economic growth. As alluded to earlier in this chapter, globalization is considered to reduce corruption through international laws' application and usage. In some cases, corruption correlates with celebrations of mega-events worldwide (Bellido et al., 2021). Therefore, the causes of corruption are related to various literacies that are seen as drivers of the perceived vice.

In the age of globalization, corruption is of particularly great concern. Therefore, the study of globalization relates to corruption is necessary. In some cases, corruption within the companies' operations in emerging nations decreases once they enter the global market (Attila, 2020). On the other hand, the same study posits that countries that show mature political globalization experiences may have more corrupt behaviors. The economic, social, and political impacts of globalization have been argued extensively in both the literature and governmental commissions at the World Trade Organization (WTO) meetings. This indicates that reducing national-level corruption creates greater economic freedom, which leads to increases in economic globalization (exports and inward FDI). It is important to note that more significant human capital and resources are required to reduce corruption (Contractor & Mudambi, 2008). Mauro's (1998) works have shown that countries can achieve higher economic development and economic globalization and freedom. Globalization and terrorism are exceptional cases of corruption (Agang, 2016), and these threats, in turn, can result in higher levels of recession and insecurity (Obi-uzu, 2018).

Therefore, globalization remains a significant stimulus of corruption by incentivizing international businesses to accede to new markets to displace competitors. This accelerates the growth of corruption and suffocation of international standards and ethics that sanctions corruption. The relationship between corruption and many macroeconomic factors such as human capital and economic freedom needs a more in-depth understanding to provide policymakers with a clear direction. Due to the inherent relation between economic globalization and macroeconomics, new measurement and monitoring models must be developed to determine how corruption can occur at the policy-making levels and its impact. Additionally, research into the mechanisms of how corruption and economic freedom impacts an environment for entrepreneurship needs further development.

From the above, it can be seen that the problem of 'studying corruption:'

- is of great interest to the wider audience.
- is modeled by various authors using different mathematical models and variables
- needs rigorous mathematical models with the variables that existing models do not yet consider
- needs to be addressed from the point of the fourth industrial revolution (Industry 4.0); specifically, in terms of computerization, automation of various processes, and then the entire problem needs to be studied with the possible use of big data and visualizations.

This chapter provides a summary of various mathematical models and critical variables. It further provides insights into various parameters and variables that are not yet considered in the existing models and how they can be incorporated. Notably, globalization's effect on digitalization and automation will be taken up, and then how corruption itself is impacted by such interventions. Standardization of data and information reporting through automation will be discussed. Then it examines the nature of data and information to see whether the application of big data is appropriate or not. Further, it points to the imminent requirement of developing an enterprise information system(s) based on big data tools and platforms to stay in tune with the global digital transformation trends as a nation.

The remaining sections of the chapter are divided into various sections. The section 'variables and indices that support various models' considers various variables, indices that potentially form the input to the process of identification of corruption and illustrate the aspects of the measurement and verification of those parameters. The subsection titled 'computational models' focuses on various computational models that have been applied for studying corruption.

The following section provides a few known categories and forms of corruption and thus points to the need to have an adequately classified outcome from any computational approach. A two-layered, three-stage model is first proposed for identifying corruption and how it can be applied to diverse ecosystems. Two specific areas of application, including transactions of financial institutions and public utilities that engage in customer service, are taken up to illustrate the diverse nature of activities and engagements that may have some level of corruption as known to have existed in the traditional non-automated systems. Then, this chapter proposes the need to apply contemporary industry 4.0 principles to deal with corruption for the first time. Later, a brief discussion and possible prospects for further work are provided, and then concluding remarks are provided.

MATHEMATICAL MODELS FOR CORRUPTION

This section analyses the various mathematical models that have been suggested by various authors thus far. Firstly, essential variables and indices are explained, followed by a few fundamental computational approaches. Then a summary of various forms of corruption in different categories.

Variables and Indices that Support Various Mathematical Models

Several models for corruption have been proposed with different variables, parameters, and objectives over the years, which point out that there is no single and well-agreed approach or model. The difficulty lies in the collection of data and, thus, accurate information. A few selected models are considered [see Table 2] to explain the same.

On careful observation of the models presented in Table 1, authors have considered different variables and parameters in their approaches. Even the end output may point to a different category of the result, not necessarily detecting corruption itself. Some of the variables such as socio-cultural environment, Government Intervention, democracy, the legal system's strength, intimate and/or social behavior, employee competition, and economic environment are difficult to measure. Thus it may not be possible to quantify corruption accurately. Though there are several approaches to how the complex data and information is collected and then assimilated to support these variables, there is no single, well-agreed approach for the measurement and verification process of these parameters. This is the primary reason

Table 2. Summary of mathematical models

Author Name(s), Year	Details of the mathematical model	List of Variables	Indices or/and other parameters	Remarks
Goel and Saunoris (2017)	Corruption = f(Prosperity, Democracy, Legal System, × Governmental Characteristics, History, Geography)	Geographic expanse of a country, socio-cultural environment	Per Capita GDP, Government Intervention	Bigger governments would necessarily reduce corruption in every instance
Mikhailov, Gorbatikov, and Kornilina (2013).	Power-Society model	Corrupted officials, degrees of corruption	Supervising organization	Corruption at the lowest levels of a hierarchy is most harmful and thus should be suppressed first
Dudley, Blvd and Oregon (2016)	The rotten mango model; The red tape model; Bribe likelihood model; Employee - boss relationship model;	Corruption, Red Tape, Economic Openness, and Strength of the Legal System	Power and corruption loop structure	Corruption appears to capture key elements of the behavior of a corrupt system
Matei and Matei (2011)	Theoretical and Empirical Models	Governance processes and corruption	public organizations, state and society	Processes influencing the anti-corruption actions: political stability, courts of law, civil society, etc.
Accinelli and Sanchez Carrera (2012)	Evolutionary-game modeling	Imitative behavior	Social behavior	Corruption increases because of imitation of agents
Fath and Kay (2018)	Organizational hierarchy with corruption	The organization itself; employees	Inter-employee competition	Hierarchy and corruption are connected
Hammond (2000)	Agent-Based Computer Model based on Game-theoretic micro-level interaction	citizen agents (Citizens) and government agents (Bureaucrats)	heterogeneous population (concerning attitudes toward corruption); local information; social networks.	A transition from corruption to honesty can happen endogenously
Maslii et al. (2018)	logical probability (LI) models of risk corruption	Workers, managers and scams on investment	Corruption at service, Corruption of officials, Corruption in the institution	suitable for solving the general problem of preventing corruption
Agerberg (2020)	Simple regression model	political bias (H1); sensitivity bias (H2)		Corruption experiences are likely to be subject to sensitivity bias
Lui (1986)	Dynamic Model	People in different generations, auditing probability	Audit officials when a greater proportion of them become corrupt.	An overlapping-generations model capable of explaining various aspects of corruption. `
Malafeyev et al. (2017)	Corruption dynamics model (similar to the three-dimensional model)	Socio-economic relations; economic environment		demonstrate asymptotic behavior of the corruption network under various conditions
Matipira (2015)	Corruption – transparency model: C = f (m+d-a) C = corruption m = monopoly d = discretion a = accountability Where: a = f (t, i), which means that: t = transparency i = integrity	Monopoly, discretion, accountability, transparency, integrity	Integrity and transparency	Identifies various variables associated with corruption hence can capture accurate patterns of corruption and the related variables.

behind many authors considering the perception (CPI) approach and not identifying or quantifying the corruption itself. Furthermore, most approaches involve varying degrees of different indices as well.

On the other hand, a robust computational model does require a well-founded measurement and verification base for each parameter and data entity. Fortunately, every public and private entity's digitalization, once correctly designed and maintained, will support the requirement of accurate data.

In summary, several parameters and indices are challenging to model and even to measure. On the other hand, parameters such as numbers related to population, geographic expanse, capital investments made, and funds in a given account; are easy to measure and thus develop more legitimate information that can be verified at any time. In summary, several various parameters and indices are required for supporting computation models for corruption, and some of them can be measured easily, and some are not.

Computational Models

The chapter further examined a few well-known and standard computational models; a selected few are provided in Table 3. After considering various variables and indices, the authors have used standard computational models for achieving the set results towards determining the corruption in a way or the other. The models such as agent model, Bayesian model, regression, or dynamic, are generic but standard approaches; and thus, were applied for corruption detection. However, the computation's effectiveness and the very end result depend on the authenticity of the data collected. It is the accuracy of data collection that plays a significant role in the computation model. Table 3 summarizes the significance of some selected models.

On careful observation, it can be noted that each computational model has its strengths and merits. Most of the approaches need much statistical data and proper identification of dependent and independent variable sets. This can potentially lead to a safe conclusion that the computation model selection depends on the variables and data models. Thus, different areas (such as banking, public utilities, and judicial systems) may require different computational models to estimate the corruption correctly.

The researchers propose revisiting the mathematical models of corruption in the fourth industrial revolution and aim to model the corruption model presented above as a new model found in the fourth industrial revolution. The suggested modeling in the fourth industrial revolution will provoke several different variables relevant to the explanation of corruption and its causes therein.

A Novel Three-Stage Conceptual Model

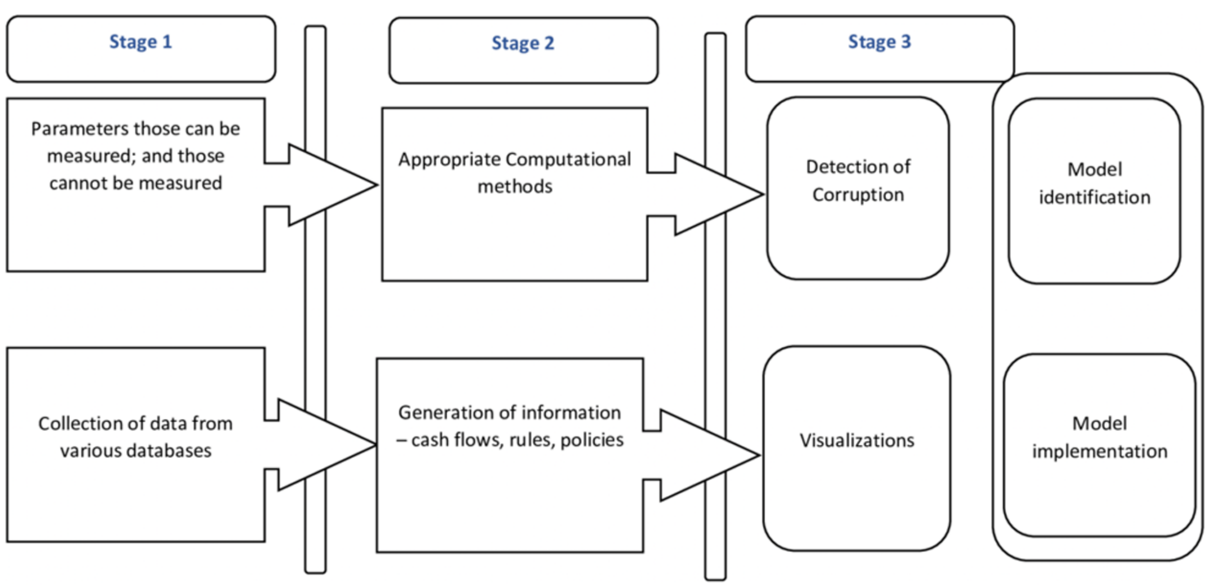
Based on the above discussion, a 3-stage conceptual model is proposed here for the first time. In a nutshell, the overall process of corruption estimation can be aggregated into two layers and three critical stages – a selection of variables, indices (which are raw data inputs); selection of the appropriate computational model, and then categorization of the corruption itself (output information) and then followed by design and development of an information system. It is important to note that this three-stage approach needs to be adopted and applied to various areas of interest such as banks, public utilities, public health facilities, and judicial systems. A few of such areas of interest are taken up for specific discussion to provide insights into the diverse nature of ecosystems in each case. Figure 1 shows the stages of the proposed model.

Table 3. Significance and application of selected models on Corruption

Model Name	Description and Significance	Application on Corruption
Agent Model; Situngkir and Khanafiah (2006); Hammond, (2000)	Assumes that principal and agent interests diverge, and "informational asymmetry to the agent's advantage." The principal can recommend the pay-off rules for the relationship.	Corruption can be identified using agent-based models. A transition from corruption to honesty can happen if appropriate policy changes are made as part of good governance.
Bayesian Model(s) Koop (2003); Stephan et al. (2009)	Bayesian decisions are informed by Bayesian probability through a well-defined statistical process. This quantifies the trade-off between various decisions, making use of probabilities and costs.	Proactive checks and audits can help managers to plan their work. This can generate an impact nationwide in ðghting corruption.
Regression techniques; Agerberg (2020)	Regression techniques are well-suited for predictive modeling and data mining tasks. It examines the relationship between two or more variables of interest and outcomes, including the influence of one or more independent variables on dependent variables.	A potent tool to establish the relationship between the root cause of corruption and corresponding effects. Corruption experiences are likely to be subject to sensitivity bias.
Dynamic Model; Steves and Rousso (2003); Malafeyev et al. (2017)	A *dynamic model* can support complex historical data analysis (for example, financial accounting of firms over the last 20 years with quarterly inputs or even less) that may have time-dependent policy changes and adjustments.	This model may be able to detect corruption by assisting forensic auditors through systematic checks, which can be included in the model framework
Structural equation modeling; Factor and Kang (2015)	It is used to analyze the *influence or* relationship between measured variables and latent constructs—an excellent example for applying this approach to determine the corruption - shadow economy relationship.	The shadow economy influences corruption more than corruption could influence the shadow economy
Econometric model; Adams Adama (2012)	This model determines the statistical envisaged relationship between the various economic variables on a particular economic phenomenon. It is a practical framework that helps in revealing the relationships among the economic variables and forecast developments.	Easy to apply and thus can establish the likelihood between corruption and government spending patterns.

Source: Drawn from various authors

Figure 1. Three-stage model for corruption identification



Essentially this two-layer, three-stage system, once realized, results in an automated monitoring system for key variables and produces assorted, summarized information continuously. Based on earlier discussions, corruption has various forms, and several different variables and computational methods exist. Hence, one computational model or the same set of variables cannot be applied to every case. Layer 1 focuses on model identification that is appropriate to a specific institution. Layer 2 focuses on a specific information system based on Industry 4.0 principles. This implies that layer 1 requires in-depth requirement analysis for a typical organization, and layer 2 involves the design and development of a specific information system that is driven by the requirement analysis from layer 1. Once this concept is implemented, various stakeholders will be able to access summarized information and visualization, along with some lead pointers on the nature of possible corruption that may have been present in the system. Detailed information on engineering design and stakeholder access privileges are avoided to save space. Since the summarized information only is presented in the visualizations, this approach naturally ensures the required anonymity. Once this automated system points to any fit case, it is possible to initiate a more in-depth, specific probe into the issue.

IMPLICATIONS: WHY INDUSTRY 4.0 AND BIG DATA FOR CORRUPTION?

Four significant industry constituents 4.0 are – measurement and control; data analysis and information generation, seamless communication of information; and information visualization. From the discussion, it is clear that different components of the society require different variables and indices to be measured (and thus controlled at the end to curb corruption). Cordis and Warren (2014) emphasized the use of databases to assess corruption, notably, the trends. Fewer sources indicate the possibility of using big data techniques and data visualizations in corruption identification and thus finding ways to mitigate the same (European Court of Auditors, 2019). However, specific details of such methods are made available as yet in a big way. Big data and its application are the essential elements of the fourth industrial revolution; they are being used in almost every field of study now. Following the fourth industrial revolution trends are also part of being in tune with recent trends and developed economies; hence, it is part of globalization. Various application areas do require independent and custom-designed databases to collect, store and process the variables and indices. Such an effort, once applied to different areas, automatically results in big data repositories; and thus, presents a fitting case for big data. Hence, the standard technology platforms and/or tools may not effectively deal with this big data. This situation automatically requires the use of specialized big data tools and platforms.

Then there are different computational models (such as dynamic, regression, Bayesian) for data analysis and information generation. Some of the corruption computational processes, especially those targeting perceptions, heavily depend on customer feedback through public user forums, social media platforms, which essentially require seamless communication of information in the public domain. Finally, the information visualization is an interesting part where only the finer points (such as CPI) can be provided through wide-ranging user-friendly visualizations. Information visualization only provides an overall summary but significantly influences both the external perceptions and internal process effectiveness effectively. Thus the entire process of dealing with corruption itself requires a considerable scale enterprise information system, which is likely to use a combination of variables, measurements; a combination of statistical and analytical models; and even wide-ranging and novel information visualization layers.

CASE STUDIES

Thus far, from the discussion, cash flows, individuals, and key organizations are central constituents where corruption can occur. In view of this, two different case scenarios are considered involving financial institutions, public institutions, and customer service models.

Case 1: Transactions of Financial Institutions (Banks)

In the modern era, banks and non-banking financial institutions (NBFCs) are the 'cash' custodians. Most banks and NBFCs are now in digital space and undergo periodical internal and external inspections. On top of that, quarterly/ yearly internal and external audits do exist. Digitalization enables an increasing number of fund transfers within and outside the state in a seamless fashion, as customers need not have to visit physically and can potentially complete the transactions in the digital space in a much shorter time. From hindsight, it may be easy to detect and even control corruption. However, parameters like funds in suspense accounts, Non-Performing Assets (NPAs), deliberate under (or over) valuations of assets and others, are not explicitly considered by authors so far. It may be possible to argue that such parameters can /will be part of the already considered parameters. However, taking direct data or even metadata of such parameters will significantly strengthen the automated corruption detection model or process.

Further, the historical valuation of assets and their changing value and quality need to be considered. For example, how corruption (or embezzlement or fraud) can be detected in a typical case, wherein - a bank has a high quantity of gold that is held as collateral for various customer loans; and someone inside or outside the bank is stealing or even replacing with a lesser value of metal (which may almost be looking same as gold). Detection is only possible through physical and standard testing of the gold periodically. Another exciting aspect can be – what if the open market value of gold itself goes below the recorded value of the bank at the time of sale of loan? Such a situation of asset value erosion may be scarce but theoretically possible. However, it does not come under the umbrella of corruption as it results from market conditions. Corruption detection models should be designed carefully so that such situations do not automatically point to corruption. In essence, more variables, parameters, and aspects can directly or indirectly influence corruption.

With the advent of NBFCs and P2P lending firms, in almost every country, the digital money movement, specifically in the form of consumer lending, has taken a new turn. The major problem with NBFCs is the sudden closure or even legally (deliberately) declaring bankruptcy, and thus leaving the customers to their fate. Typically, in this case, funds may have been transferred elsewhere or even shown as losses due to various reasons. Dynamic models that take regular internal and external audits can detect such incidents in the near future. In other words, a specific example like monitoring the transactions of a financial firm may require a specific corruption (or even possible failure) detection model, which may be different from other sectors. This also means there may not be a single model that may be well adequate for all sectors.

Corruption may exist even in the P2P lending landscape, which is considered a fully automated system. For instance, few lenders may have funded a large number of loans and thus would have large sums of money. The questions are – how to determine the source of such significant funds? What is the guarantee that dummy loans are funded by the same person(s) to avoid taxes and bring previously undisclosed funds into the disclosed category? What are the regulatory policies that control the activities of the P2P lending landscape? How transparent are their transactions? Few countries already have appropriate regulatory policies to control the NBFC and P2P. However, challenges may exist with data sharing and automated checks and controls to identify corruption.

Another interesting aspect here is cyber-crimes related to digital banking. It may be challenging to classify between crime and corruption. For instance, consider a situation wherein - an insider to a financial institution gains digital control of a customer account and then transfers funds with/ without the owner's knowledge. Though it is a criminal activity, it is a corrupt practice. So, the question is – should the corruption models consider this and classify it as a fraud? One possible argument can be it the fault of the customer for not keeping the confidentiality of the digital credentials. However, corruption is something that happens due to a fault or helpless state of someone. It also should be noted that cyber-crimes (and hence the stolen funds) are on the rise and assuming very high propositions. The question is how to detect, classify, and then at the end, how to control such undesired situations? It is interesting to note that if the digital systems are designed adequately, they will quickly detect and even prevent such instances and thus minimize the damages to the end customer. This requires reversing the fraudulent transaction and taking the offender into judicial custody to pursue the criminal case with due process of law.

Currently, law enforcement officials can identify and punish a very few cyber-criminals only due to various reasons; including the availability of information, legally admissible proof, and resources for taking action – all in a tiny window period; as delays in filing the complaint by the victims, criminals may abandon their electronic devices, close their accounts, may operate from a distant location. It should be observed that the challenges here include – advances in digital space do come to a new range of criminals; requirement of automated corruption detection systems; smart (and resourceful) law-enforcement frameworks and systems.

The role of shell companies is a widely discussed topic under corruption. Corruption takes place on much larger scales through the transfer (or circulation) of funds to and from known and unknown destinations. Almost all countries are susceptible to this form of corruption, as the movement of funds in this category actually use the standard legal framework and yet steal away substantial amounts of funds. Regulatory frameworks play a vital role, and sometimes changing the law well in time may be the key. Most known corruption models do consider this aspect; however, they may not specifically identify the amounts that possibly have been sailed outside /inside the state. In other words, a majority of the existing models may be able to identify various indices such as CPI; but may not really categorize the forms of corruption and thus may not quantify the amounts. However, it should be noted that a simple, standard audit will easily detect such a form of corruption and even quantify the amounts involved in a precise fashion. It may be interesting to consider the case of an automated process model for timely detection and prevention of corruption.

Case 2: Transactions of Public Utilities and Customer Service Models

Other well-known and major areas for corruption are the public utilities that provide essential services. These include water, electricity, communication, gas and transport systems, and other services. The day-to-day life is tangled with such essential services, yet there occurs much corruption. Not all countries, especially developing and under developing, have automated, web-based portals to manage customer services, including complaints and feedback. The landscape of public utilities is heavily controlled by the state in most countries and yet not fully transparent and automated. Reasons for operating (and controlling) manually include – fear of getting detected of corrupt practices, incompetence, or fear of losing illegal income.

On the other hand, custodians of such public entities are generally incapacitated in terms of digital knowledge and resources due to their outdated perceptions and educational qualifications. Also, it is common to see a lack of support from the current legal framework. Many authors pointed to the immediate need to computerize the systems, provide automated services, and keep the free domain information. Though the landscape of public utilities may seem very obvious (or seen with lesser interest) candidate for detecting corruption through automation, this is the significant and essential area where significant digital automation needs to be undertaken in most countries. This means moving the nation and the local daily life forward digitally. Such an objective requires proper automation systems and serving models, which may point to the primary objective of achieving a high degree of customer satisfaction and thus not to the detection of corruption or fraud. It should be noted that CPI is reported to be less where automated services and grievance addressing systems are present and actively functional.

One of the underlying conditions of serving the public is the individual's eligibility criteria or the organization. Most services can be readily accessed once the customer provides proof of its own identity and proof of address. However, how fast the concerned authorities can verify such credentials? Such a verification process requires a robust and well-designed automated platform that can potentially assist in the verification process. This requires a nationwide effort to develop a digital platform that integrates identification documents such as birth certificate, passport, mobile number, citizen identification number, and other details. Most countries, including developing ones, have, but still, corruption does occur as such systems are not adequately robust; and, thus, are limited in their functionality. Though this is mostly part of e-governance, it is indeed a significant step in digitally advancing the nation and thus achieving lower values of CPI.

When it comes to field level customer service itself, let us examine the case of a state-owned power utility, which needs to monitor the electricity bills' timely payments and thus stop the power supply if required. This situation itself can have a few different possibilities – including consumer challenging (or disputing) the meter readings/ bills; consumer cleared the dues, but power is not restored; the customer is resorting to power pilferage. Similarly, a prospective customer has requested a new connection and is made to wait long. Properly designed customer service portals with discussion forums empower the public to resolve most situations without going through various offices and thus avoiding bribing or undesirable situations. Such automated systems equally empower the utilities to clean up their internal working mechanisms and become more efficient. Such digital advancements improve customer confidence in general. In advanced societies, even police departments actively participate in social media networks such as Facebook, Twitter, Instagram, and other networks, to figure out the trends and situations and then get ready with the required appropriate control action. The key points here are – measurement and verification systems are essential; functional and well-designed digital platforms are essential to assist in corruption detection. On the other hand, a few critical questions need to be answered: Is it possible to summarize the posts on Facebook or/and tweets on Twitter, let us say, over a year; to determine (automatically) the quality of service provided and thus the related CPI? How supportive is each technology platform (such as utility-owned web portals, Facebook, Twitter, etc.) to provide the required data for computation of related CPI?

DISCUSSION AND FUTURE DIRECTIONS

The future developments towards e-governance are quite significant in the sense that it includes establishing smart cities, e-courts, programmable authenticity/identity verification platforms, digital land registration systems, automated public services; transparent processes for exports, imports, independent and effective regulatory bodies, digital platforms for immigration and port-controls. Such efforts do require significant investment in the development of digital infrastructure. Such an ecosystem may sound too theoretical, too distant dream, but yet realizable with concerted efforts over time, once there is determination. Working towards developing such large-scale cyber-physical systems is not just in the true spirit of following industry 4.0; but to improve the internal processing efficiency, mitigate corruption, and achieving good international rankings for the country in various aspects. In the absence of such efforts (and in the absence of well-established corruption identification and mitigation frameworks), counties have to depend heavily on externally managed indicators and perceptions; that may be very well biased in a few instances.

On the other hand, variables, indices, and computational models; and their combinational sets for specific use should be revisited in the context of industry 4.0 application. That said, this area offers numerous challenges and opportunities for researchers to revisit the variables, indices, development of combinational models and approaches, and development of enterprise information systems with appropriate platforms, tools, and technologies. A straightforward example of this is – to examine the criteria for establishing an online portal for registering complaints and reporting corruption. If such a system is already in place, it should be further examined to see how well it supports providing the enterprise system's visualization layer.

In hindsight, initially, digital transformation may be seen in dim light due to the heavy financial burden in establishing automated systems that provide seamless information and continuous maintenance, and the requirements of the talented and qualified workforce, and the corresponding expenditure towards salaries. However, in the long term, this results in a stable economy due to better (or improved) CPI, an educated and skilled nation, accessible and transparent flow of foreign investments with higher degrees of confidence and trust. Problems with data accuracy, cybersecurity, overall costs, ownership of information, and legal hurdles will come into the development path; but can be resolved once the goals and objectives are well set and efforts are well-concerted. Indeed, globalization is nothing but following the best practices, adopting modern, proven technologies and approaches, and looking up to developed countries. Moving towards total digitalization and establishing enterprise information systems for corruption identification and mitigation based on industry 4.0 is the new norm in the immediate future. Hence effective measures and provisions must be put in place to monitor corruption, and importantly, a significant level of effort should be made towards building automated tools that work with big data and practical information systems. Also, as stated earlier, research needs to be undertaken on how corruption can be identified or pursued based on the information generated by the public through social media.

CONCLUSION

Research on corruption and related topics has been of significant interest over the years and remains so. Corruption still exists, and it is advancing along with the global societal and technological trends. World Bank views corruption as a significant threat to its twin objectives of reducing poverty and achieving shared prosperity (World Bank Group, 2020). As a global challenge with a disproportionate impact on societies, corruption requires global solutions.

The global COVID-19 pandemic has resulted in large-scale emergency spending by government, non-governmental and private organizations. Some of these expenditures have occurred without adhering to standard checks and balances, thus exposing institutions to corruption tendencies. The pandemic has necessitated the adoption of specific technologies and platforms, thus enhancing industry 4.0. Most institutions have found themselves engaging in some transitions necessitated by circumstances.

As suggested in this chapter, it is time that appropriate models for every entity where corruption possibly can occur and develop information systems using industry 4.0 technology platforms. Tools based on big data have to be developed in sync with changing times and changing forms of corruption to eliminate the same.

REFERENCES

Abed, G. T., & Gupta, S. (Eds.). (2002). Governance, Corruption, and Economic Performance. Washington, DC: International Monetary Fund. *Science*, *36*(2), 136–158.

Accinelli, E., & Sanchez Carrera, E. J. (2012). The evolutionary game of poverty traps. *Manchester School*, *80*(4), 381–400. doi:10.1111/j.1467-9957.2011.02262.x

Acemoglu, D., Johnson, S., & Robinson, J. A. (2006). Laboratory experiments on corruption: International handbook on the economics of Corruption. Cheltenham, UK: Edward Elgar.

Agang, B. (2016). Globalization and Terrorism: Corruption as a Case to Ponder Sunday. *Pyrex Journal of Law and Conflict Resolution*, *2*(1), 1–8.

Agerberg, M. (2020). The lesser evil? Corruption voting and the importance of clean alternatives. *Comparative Political Studies*, *53*(2), 253–287. doi:10.1177/0010414019852697

Akhter, S. H. (2004). Is globalization what it's cracked up to be? Economic freedom, corruption, and human development. *Journal of World Business*, *39*(3), 283–295. doi:10.1016/j.jwb.2004.04.007

Al-Marhubi, F. A. (2000). Corruption and inflation. *Economics Letters*, *66*(2), 199–202. doi:10.1016/S0165-1765(99)00230-X

Al-Zaman, M. S. (2020). Healthcare Crisis in Bangladesh during the COVID-19 Pandemic. *The American Journal of Tropical Medicine and Hygiene*, *103*(4), 1357–1359. doi:10.4269/ajtmh.20-0826 PMID:32828138

Alesina, A., & Weder, B. (2002). Do Corrupt Governments Receive Less Foreign Aid? *The American Economic Review*, *92*(4), 1126–1137. doi:10.1257/00028280260344669

Andersen, R. F., & Dinesen, P. T. (2017). *Social capital in the Scandinavian countries. In Routledge Handbook of Scandinavian Politics*. Routledge.

Antonakas, N. P., Giokas, A. E., & Konstantopoulos, N. (2013). Corruption in Tax Administration: Interviews with Experts. *Procedia: Social and Behavioral Sciences*, *73*(1), 581–589. doi:10.1016/j.sbspro.2013.02.094

Asiedu, E., & Freeman, J. (2009). The effect of corruption on investment growth: Evidence from firms in Latin America, Sub-Saharan Africa, and transition countries. *Review of Development Economics*, *13*(2), 200–214. doi:10.1111/j.1467-9361.2009.00507.x

Asongu, S. (2014). Globalization (fighting), corruption and development: How are these phenomena linearly and nonlinearly related in wealth effects? *Journal of Economic Studies (Glasgow, Scotland)*, *14*(3), 346–369. doi:10.1108/JES-04-2012-0048

AttilaJ. (2020). Corruption, Globalization and the Outbreak of COVID-19. doi:10.2139srn.3742347

Aycan, Z., Kanungo, R., Mendonca, M., Yu, K., Deller, J., Stahl, G., & Kurshid, A. (2000). Impact of culture on human resource management practices: A 10-country comparison. *Applied Psychology*, *49*(1), 192–221. doi:10.1111/1464-0597.00010

Bahoo, S., Alon, I., & Paltrinieri, A. (2020). Corruption in international business: A review and research agenda. *International Business Review*, *29*(4), 101660. doi:10.1016/j.ibusrev.2019.101660

Basyal, D. K., Poudyal, N., & Seo, J. W. (2018). Does E-government reduce corruption? Evidence from a heterogeneous panel data model. *Transforming Government: People. Process and Policy*, *12*(2), 134–154.

Bauhr, M. (2017). Need or greed? Conditions for collective action against corruption. *Governance: An International Journal of Policy, Administration and Institutions*, *30*(4), 561–581. doi:10.1111/gove.12232

Bayar, Y. (2020). Globalization and socio-economic development in post-transition European Union countries: Panel causality and regression analyses. *Eastern Journal of European Studies*, *11*(1), 45–61.

Bellido, H., Olmos, L., & Román-Aso, J. A. (2021). The influence of government ideology on corruption: The impact of the Great Recession. *Economics and Politics*, 1–32.

Blake, C. H., & Martin, C. G. (2002, April). Combating Corruption: Re-examining the Role of Democracy. In *Annual Meeting of the Midwest Political Science Association, Chicago, April* (pp. 25-28). Academic Press.

Bouzid, B. N. (2016). Dynamic relationship between corruption and youth unemployment: empirical evidences from a system GMM approach. *World Bank Policy Research Working Paper*, (7842).

Choi, J. P., & Thum, M. (2005). Corruption and the shadow economy. *International Economic Review*, *46*(3), 817–836. doi:10.1111/j.1468-2354.2005.00347.x

Chong, A., De La, O. A. L., Karlan, D., & Wantchekon, L. (2015). Does corruption information inspire the fight or quash the hope? A field experiment in Mexico on voter turnout, choice, and party identification. *The Journal of Politics*, *77*(1), 55–71. doi:10.1086/678766

Christensen, J. (2012). The hidden trillions: Secrecy, corruption, and the offshore interface. *Crime, Law, and Social Change*, *57*(3), 325–343. doi:10.100710611-011-9347-9

Ciocchini, F., Durbin, E., & Ng, D. T. (2003). Does corruption increase emerging market bond spreads? *Journal of Economics and Business*, *55*(5-6), 503–528. doi:10.1016/S0148-6195(03)00052-3

Contractor, F. J., & Mudambi, S. M. (2008). The influence of human capital investment on the exports of services and goods: An analysis of the top 25 services outsourcing countries. *Management International Review*, *48*(4), 433–445. doi:10.100711575-008-0025-9

Cordis, A. S., & Warren, P. L. (2014). Sunshine as a disinfectant: The effect of state Freedom of Information Act laws on public corruption. *Journal of Public Economics*, *115*, 18–36. doi:10.1016/j.jpubeco.2014.03.010

d'Agostino, G., Dunne, J. P., & Pieroni, L. (2016). Corruption and growth in Africa. *European Journal of Political Economy*, *43*(1), 71–88. doi:10.1016/j.ejpoleco.2016.03.002

Deliversky, J. (2016). Preventing corruption in the education system. *Journal of Educational and Instructional Studies in the World, 6*(1), 141-146.

Della, P. D., & Vannucci, A. (2016). *The hidden order of corruption: An institutional approach*. Routledge.

Denison, D. R. (1990). *Corporate culture and organizational effectiveness*. John Wiley & Sons.

Dudley, R. G., Blvd, S. W. T., & Oregon, B. (2016). *The Rotten Mango: The Effect of Corruption on International Development Projects*. Corpus ID: Political Science.

Dutta, M. (2018). Globalization, Corruption and Women Empowerment. *Economic Papers: A Journal of Applied Economics and Policy, 37*(3), 327-343.

Dwivedi, O. P. (1967). Bureaucratic corruption in developing countries. *Asian Survey*, *7*(4), 245–253. doi:10.2307/2642478

Efrat, K. (2014). The direct and indirect impact of culture on innovation. *Technovation*, *34*(1), 12–20. doi:10.1016/j.technovation.2013.08.003

Erdogan, M., & Unver, M. (2015). Determinants of foreign direct investments: Dynamic panel data evidence. *International Journal of Economics and Finance*, *7*(5), 82. doi:10.5539/ijef.v7n5p82

European Court of Auditors. (2019). *Big data analytics as a tool for auditors to identify and prevent fraud and corruption in public procurement.* Retrieved February 7, 2021, from https://medium.com/ecajournal/big-data-analytics-as-a-tool-for-auditors-to-identify-and-prevent-fraud-and-corruption-in-public-68184529334c

Factor, R., & Kang, M. (2015). Corruption and population health outcomes: An analysis of data from 133 countries using structural equation modeling. *International Journal of Public Health*, *60*(6), 633–641. doi:10.100700038-015-0687-6 PMID:25994589

Fath, S., & Kay, A. C. (2018). Organizational Behavior and Human Decision Processes "If hierarchical then corrupt": Exploring people's tendency to associate hierarchy with corruption in organizations. *Organizational Behavior and Human Decision Processes*, *149*(1), 145–164. doi:10.1016/j.obhdp.2018.10.004

Ferwerda, J., Deleanu, I., & Unger, B. (2017). Corruption in public procurement: Finding the right indicators. *European Journal on Criminal Policy and Research*, *23*(2), 245–267. doi:10.100710610-016-9312-3

Freeland, C. (2012). *Plutocrats: The Rise of the New Global Super-Rich and the Fall of Everyone Else*. Doubleday.

Frolova, I. I. (2014). Research on corruption in the education system. *Asian Social Science*, *10*(20), 21. doi:10.5539/ass.v10n20p21

Gillanders, R. (2014). Corruption and Infrastructure at the Country and Regional Level. *The Journal of Development Studies*, *50*(6), 803–819. doi:10.1080/00220388.2013.858126

Glynn, P., Kobrin, S. J., & Naim, M. (1997). The globalization of corruption. *Corruption and the Global Economy, 7*, 17-27.

Goel, R. K., & Saunoris, J. W. (2017). The nexus of white-collar crimes: Shadow economy, corruption, and uninsured motorists. *Applied Economics*, *49*(31), 3032–3044. doi:10.1080/00036846.2016.1251570

Golden, M. A. (2002). Does Globalization Reduce Corruption? Some Political Consequences of Economic Integration. Department of Political Science, University of California. 10.1.1.483.8492

Gründler, K., & Potrafke, N. (2019). Corruption and economic growth: New empirical evidence. *European Journal of Political Economy*, *60*, 101810. doi:10.1016/j.ejpoleco.2019.08.001

Hacker, J. S., & Pierson, P. (2010). *Winner-take-all politics: How Washington made the rich richer—and turned its back on the middle class*. Simon & Schuster.

Hammond, R. (2000). *Endogenous transition dynamics in corruption: An agent-based computer model*. Center on Social and Economic Dynamics.

Harris, R., & Davison, R. (2002). Anxiety and involvement: Cultural dimensions of attitudes toward computers in developing societies. In *Global perspective of information technology management* (pp. 234–259). IGI Global. doi:10.4018/978-1-931777-11-7.ch017

Hillman, A. L. (2004). Corruption and public finance: An IMF perspective. *European Journal of Political Economy*, *20*(4), 1067–1077. doi:10.1016/j.ejpoleco.2003.09.004

Hindriks, J., Keen, M., & Muthoo, A. (1999). Corruption, extortion and evasion. *Journal of Public Economics*, *74*(3), 395–430. doi:10.1016/S0047-2727(99)00030-4

Hofstede, G. (1983). National cultures in four dimensions: A research-based theory of cultural differences among nations. *International Studies of Management & Organization*, *13*(1-2), 46–74. doi:10.1080/00208825.1983.11656358

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations*. Sage publications.

Holcombe, R. G., & Boudreaux, C. J. (2015). Regulation and corruption. *Public Choice*, *164*(1), 75–85. doi:10.100711127-015-0263-x

House, R., Javidan, M., Hanges, P., & Dorfman, P. (2002). Understanding cultures and implicit leadership theories across the globe: An introduction to project GLOBE. *Journal of World Business*, *37*(1), 3–10. doi:10.1016/S1090-9516(01)00069-4

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & Gupta, V. (Eds.). (2004). *Culture, leadership, and organizations: The GLOBE study of 62 societies*. Sage publications.

Huang, C. J. (2016). Is corruption bad for economic growth? Evidence from Asia-Pacific countries. *The North American Journal of Economics and Finance*, *35*(1), 247–256. doi:10.1016/j.najef.2015.10.013

Husted, B. W. (2002). Culture and international anti-corruption agreements in Latin America. *Journal of Business Ethics*, *37*(4), 413–422. doi:10.1023/A:1015248921716

Knutsen, C. H., Kotsadam, A., Olsen, E. H., & Wig, T. (2017). Mining and local corruption in Africa. *American Journal of Political Science*, *61*(2), 320–334. doi:10.1111/ajps.12268

Koop, G. M. (2003). *Bayesian econometrics*. John Wiley & Sons Inc.

Kovacic, Z. J. (2005). A Brave New E-World? An Exploratory Analysis of Worldwide E-Government Readiness, Level of Democracy, Corruption, and Globalization. *International Journal of Electronic Government Research*, *1*(3), 15–32. doi:10.4018/jegr.2005070102

Koyuncu, J., & Ünver, M. (2017). The Association between Corruption and Globalization in African Countries. *Sosyal Bilimler Araştırma Dergisi*, *6*(4), 20–28.

Kraay, A., Zoido-Lobaton, P., & Kaufmann, D. (2002). *Governance matters II: Updated indicators for 2000–01*. The World Bank. doi:10.1596/1813-9450-2772

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1999). The quality of government. *Journal of Law Economics and Organization*, *15*(1), 222–279. doi:10.1093/jleo/15.1.222

Lalountas, D. A., Manolas, G. A., & Vavouras, I. S. (2011). Corruption, globalization and development : How are these three phenomena related? *Journal of Policy Modeling*, *33*(4), 636–648. doi:10.1016/j.jpolmod.2011.02.001

Lambsdorff, J. G. (2003). How corruption affects productivity. *Kyklos*, *56*(4), 457–474. doi:10.1046/j.0023-5962.2003.00233.x

Leal, P. H., & Marques, A. C. (2021). The environmental impacts of globalization and corruption: Evidence from a set of African countries. *Environmental Science & Policy*, *115*, 116–124. doi:10.1016/j.envsci.2020.10.013

Lederman, D., Loayza, N., & Soares, R. R. (2001). Accountability and Corruption: Political Institutions Matter. *Economics and Politics*, *17*(1), 1–35. doi:10.1111/j.1468-0343.2005.00145.x

Lui, F. T. (1986). A dynamic model of corruption deterrence. *Journal of Public Economics*, *31*(2), 215–236. doi:10.1016/0047-2727(86)90019-8

Madanipour, A., & Thompson, M. F. (2020). Is globalization linked to low corruption in OECD countries? *Crime, Law, and Social Change*, *73*(1), 443–455. doi:10.100710611-019-09874-1

Malafeyev, O. A., Nemnyugin, S. A., Rylow, D., Kolpak, E. P., & Awasthi, A. (2017, July). Corruption dynamics model. In AIP Conference Proceedings: Vol. 1863. *No. 1* (p. 170013). AIP Publishing LLC.

Maslii, N., Zakharchenko, N., Butenko, V., Savastieieva, O., Butenko, T., & Shyriaieva, L. (2018). Modern technologies of detection and prevention of corruption in emerging information society. *Problems and Perspectives in Management*, *16*(1), 58–67. doi:10.21511/ppm.16(1).2018.06

Matei, A. I., & Matei, L. (2011). Assessing the anti-corruption strategies: Theoretical and empirical models. *Journal of Management and Strategy*, *2*(1), 23–40. doi:10.5430/jms.v2n1p23

Matipira, L. (2015). *The Impact of Corporate Governance and Capacity Utilization on Zimbabwe Aviation Industry*. Christ University Press.

Mauro, P. (1998). Corruption: Causes, consequences, and agenda for further research. *Finance & Development*, *35*(1), 11–14.

Menard, A. R., & Weill, L. (2016). Understanding the link between aid and corruption: A causality analysis. *Economic Systems*, *40*(2), 260–272. doi:10.1016/j.ecosys.2016.01.001

Mietzner, M. (2020). Populist anti-scientism, religious polarisation, and institutionalized corruption: How Indonesia's democratic decline shaped its COVID-19 response. *Journal of Current Southeast Asian Affairs*, *39*(2), 227–249. doi:10.1177/1868103420935561

Mikhailov, A. P., Gorbatikov, E. A., & Kornilina, E. D. (2013). A System-Social Approach to the Modeling of Corruption. *Mediterranean Journal of Social Sciences*, *4*(9), 332. doi:10.5901/mjss.2013.v4n9p332

Mukherjee, D. (2018). *Corruption in International Business : Does Economic Globalization Help ? Global business review.* Sage Publications. doi:10.1177/0972150917713841

Muranda, Z., Frank, R., & Saruchera, F. (2014). Land as the nexus in youth, female unemployment and poverty reduction. Harare: University of Zimbabwe (U.Z.) Publications.

Obi-Uzu, B. (2018). Economic Globalization in the Face of Recession, Corruption and Insecurity. *International Journal of Advanced Studies in Ecology*, *Development and Sustainability*, *5*(1), 12–19.

Onchari, D. G. The Relationship between Corruption and Unemployment Rates in Kenya. *Akademi Sosyal Bilimler Dergisi, 6*(17), 309-318.

Owusu, E. K., Chan, A. P., & Hosseini, M. R. (2020). Impacts of anti-corruption barriers on the efficacy of anti-corruption measures in infrastructure projects: Implications for sustainable development. *Journal of Cleaner Production*, *246*, 119078. doi:10.1016/j.jclepro.2019.119078

Park, B., & Khanoi, O. (2017). How does the globalization of firms affect corruption in developing economies? *Journal of Korea Trade*, *21*(3), 256–270. doi:10.1108/JKT-02-2017-0022

Pasculli, L., & Ryder, N. (2019). Corruption and globalization. Towards an interdisciplinary scientific understanding of corruption as a global crime. In Corruption in the Global Era: Causes, Sources and Forms of Manifestation. New York: Routledge.

Persson, T., & Tabellini, G. (2006). Democracy and development: The devil in the details. *The American Economic Review*, *96*(2), 319–324. doi:10.1257/000282806777212396

Phillips, P. C. (1996). Econometric model determination. *Econometrica*, *64*(4), 763–812. doi:10.2307/2171845

PWC. (2017). *Five forces that will reshape the global landscape of anti-bribery and anti-corruption.* Retrieved February 7, 2021 from https://www.pwc.co.za/en/assets/pdf/anti-corruption-south-africa.pdf

Robinson, J. A., & Acemoglu, D. (2012). Why nations fail: The origins of power, prosperity, and poverty. Johannesburg: Profile Pubhishers.

Robinson, M. (Ed.). (1998). *Corruption and Development*. Dublin: Cass Frank & Sons.

Saruchera, F. (2014). *Determinants of commercialization of technological innovations in developing economies: a study of Zimbabwe's research institutes* (Doctoral dissertation). Durban: University of KwaZulu-Natal.

Saruchera, F., & Asante-Darko, D. (2021). Reverse logistics, organizational culture and firm operational performance: Some empirical evidence. *Business Strategy & Development*, *4*(1), bsd2.161. Advance online publication. doi:10.1002/bsd2.161

Saruchera, F., & Phiri, M. A. (2016). Technological Innovations Performance and Public-Private-partnerships. *Corporate Ownership & Control*, *13*(4), 549–557. doi:10.22495/cocv13i4c4p4

Scholl, W., & Schermuly, C. C. (2020). The impact of culture on corruption, gross domestic product, and human development. *Journal of Business Ethics*, *162*(1), 171–189. doi:10.100710551-018-3977-0

Shleifer, A., & Vishny, R. W. (1993). Corruption. *The Quarterly Journal of Economics*, *108*(3), 599–617. doi:10.2307/2118402

Situngkir, H., & Khanafiah, D. (2006, October). Theorizing corruption through agent-based modeling. In *9th Joint International Conference on Information Sciences (JCIS-06)* (pp. 561-564). Paris: Atlantis Press.

Stephan, K. E., Penny, W. D., Daunizeau, J., Moran, R. J., & Friston, K. J. (2009). Bayesian model selection for group studies. *NeuroImage*, *46*(4), 1004–1017. doi:10.1016/j.neuroimage.2009.03.025 PMID:19306932

Tabish, S. Z. S., & Jha, K. N. (2012). The impact of anti-corruption strategies on corruption free performance in public construction projects. *Construction Management and Economics*, *30*(1), 21–35. doi:10.1080/01446193.2011.654128

Torgler, B., & Piatti, M. (2013). Extraordinary wealth, globalization, and corruption. *Review of Income and Wealth*, *59*(2), 341–359. doi:10.1111/roiw.12027

Treisman, D. (2000). The causes of corruption: A cross-national study. *Journal of Public Economics*, *76*(3), 399–457. doi:10.1016/S0047-2727(99)00092-4

Tukuta, M., & Saruchera, F. (2015). Challenges facing procurement professionals in developing economies: Unlocking value through professional international purchasing. *Journal of Transport and Supply Chain Management*, *9*(1), 1–9. doi:10.4102/jtscm.v9i1.152

Welsch, H. (2008). The welfare costs of corruption. *Applied Economics*, *40*(14), 1839–1849. doi:10.1080/00036840600905225

World Bank. (2011). World Development Report 2011: Conflict, Security and Development. Washington, DC: World Bank.

World Bank Group. (2007). *Helping Countries Combat Corruption: The Role of the World Bank*. Retrieved February 9, 2021 from http://www1.worldbank.org/publicsector/anticorrupt/corruptn/cor02.htm

World Bank Group. (2020). *Brief: Combating Corruption*. Retrieved February 7, 2021, from http://www1.worldbank.org/publicsector/anticorrupt/corruptn/cor02.htm

Wu, S., Li, B., Nie, Q., & Chen, C. (2017). Government expenditure, corruption, and total factor productivity. *Journal of Cleaner Production*, *168*, 279–289. doi:10.1016/j.jclepro.2017.09.043

You, J. S. (2014). Land reform, inequality, and corruption: A comparative historical study of Korea, Taiwan, and the Philippines. *The Korean Journal of International Studies*, *12*(1), 191–224. doi:10.14731/kjis.2014.06.12.1.191

Zekos, G. I. (2004). Ethics versus corruption in globalization. *Journal of Management Development*, *23*(7), 631–647. doi:10.1108/02621710410546641

Zhao, J. H., Kim, S. H., & Du, J. (2003). The impact of corruption and transparency on foreign direct investment: An empirical analysis. *MIR. Management International Review*, *43*(1), 41–62.

ADDITIONAL READING

Badinger, H., & Nindl, E. (2014). Globalization and corruption revisited. *World Economy*, *37*(10), 1424–1440. doi:10.1111/twec.12156

Jancsics, D. (2014). Interdisciplinary perspectives on corruption. *Sociology Compass*, *8*(4), 358–372. doi:10.1111oc4.12146

Lio, M. C., Liu, M. C., & Ou, Y. P. (2011). Can the internet reduce corruption? A cross-country study based on dynamic panel data models. *Government Information Quarterly*, *28*(1), 47–53. doi:10.1016/j.giq.2010.01.005

Lučić, D., Radišić, M., & Dobromirov, D. (2016). Causality between corruption and the level of GDP. *Economic research-. Ekonomska Istrazivanja*, *29*(1), 360–379. doi:10.1080/1331677X.2016.1169701

KEY TERMS AND DEFINITIONS

Bribery: Collusion or extortion that involves soliciting for gifts, loans, fees, rewards, or other benefits that are not channeled through the detectable source(s).

Corruption: A sophisticated, well-structured, and deliberately designed crime committed with common knowledge, usually secretively.

Ethics: Moral values and principles that regulate individual actions based on societal values.

Industry 4.0: Also known as the Fourth Industrial Revolution. It is a modern industrial phase focusing on interconnectivity, robotics, machine learning, and real-time data.

Compilation of References

Aalbers, R., & Dolfsma, W. (2014). Innovation despite reorganization. *The Journal of Business Strategy*, *35*(3), 18–25. doi:10.1108/JBS-06-2013-0046

Abazid, M. (2017). The quality control implementation in the construction projects in Saudi Arabia. Saudi Arabia: Near East University.

Abed, G. T., & Gupta, S. (Eds.). (2002). Governance, Corruption, and Economic Performance. Washington, DC: International Monetary Fund. *Science*, *36*(2), 136–158.

Aboutalebi, R., & Tan, H. (2014). A Hybrid Model for International Strategy Implementation. In *56th annual conference of AIB: International Business, Local Contexts in Global Business*. Beedie School of Business, Simon Fraser University.

Aboutalebi, R. (2016). Strategies for effective worldwide supply chains. In B. Christiansen (Ed.), *Handbook of research on global supply chain management* (pp. 1–14). IGI Global. doi:10.4018/978-1-4666-9639-6.ch001

Aboutalebi, R. (2017). The taxonomy of international manufacturing strategies. In L. Brennan & A. Vecchi (Eds.), *International manufacturing strategy in a time of great flux* (pp. 17–41). Springer. doi:10.1007/978-3-319-25351-0_2

Accinelli, E., & Sanchez Carrera, E. J. (2012). The evolutionary game of poverty traps. *Manchester School*, *80*(4), 381–400. doi:10.1111/j.1467-9957.2011.02262.x

Acemoglu, D., Johnson, S., & Robinson, J. A. (2006). Laboratory experiments on corruption: International handbook on the economics of Corruption. Cheltenham, UK: Edward Elgar.

Achillas, C., Tzetzis, D., & Raimondo, M. (2017, January). Alternative production strategies based on the comparison of additive and traditional manufacturing technologies. *International Journal of Production Research*, *55*(12), 3497–3509. doi:10.1080/00207543.2017.1282645

Ackerman, R. W. (1970). Influence of Integration and Diversity on the Investment Process. *Administrative Science Quarterly*, *15*(3), 341–351. doi:10.2307/2391624

Ács, Z. J., Szerb, L., & Autio, E. (2016). *The Global entrepreneurship index 2016*. The Global Entrepreneurship and Development Institute. doi:10.13140/RG.2.2.17692.64641

Ács, Z. J., Szerb, L., Autio, E., & Lloyd, A. (2017). *The Global entrepreneurship index*. The Global Entrepreneurship and Development Institute. doi:10.1007/978-3-319-63844-7_3

Ada, M. S., Agu, O., & Umunna, G. (2016). Impact of external debt on economic growth in Nigeria: An ARDL bound testing approach. *Journal of Economics and Sustainable Development*, *7*(10), 16–26.

Adeniyi, O., Ajide, B., & Salisu, A. (2015). Capital flows, financial development and growth in sub-Saharan Africa. *Journal of Economic Development*, *40*(3), 85–103. doi:10.35866/caujed.2015.40.3.004

Agang, B. (2016). Globalization and Terrorism: Corruption as a Case to Ponder Sunday. *Pyrex Journal of Law and Conflict Resolution*, *2*(1), 1–8.

Agarwal, R., Sarkar, M., & Echambadi, R. (2002). The Conditioning Effect of Time on Firm Survival: An Industry Life Cycle Approach. *Academy of Management Journal*, *45*(5), 971–994.

Agbloyor, E. K., Abor, J. Y., Adjasi, C. K. D., & Yawson, A. (2014). Private capital flows and economic growth in Africa: The role of domestic financial markets. *Journal of International Financial Markets, Institutions and Money*, *30*, 137–152. doi:10.1016/j.intfin.2014.02.003

Agerberg, M. (2020). The lesser evil? Corruption voting and the importance of clean alternatives. *Comparative Political Studies*, *53*(2), 253–287. doi:10.1177/0010414019852697

Ahmad, F., Draz, M. U., Su, L. J., Ozturk, I., & Rauf, A. (2018). Tourism and Environmental Pollution: Evidence from the One Belt One Road Provinces of Western China. *Sustainability*, *10*(10), 3250. doi:10.3390u10103520

Ahmad, F., Draz, M. U., Su, L. J., & Rauf, A. (2019). Taking the bad with the good: The nexus between tourism and environmental degradation in the lower middle-income Southeast Asian economies. *Journal of Cleaner Production*, *233*, 1240–1249. doi:10.1016/j.jclepro.2019.06.138

Ahmad, F., Draz, M. U., & Yang, S. C. (2016). Foreign portfolio inflows and economic growth: Evidence from ASEAN5. *Actual Problems of Economics*, *179*(5), 57–69.

Ahmad, F., Yang, S. C., & Draz, M. U. (2015). Causality between foreign portfolio inflows and economic growth: Evidence from China and India. *International Journal of Economics and Finance*, *7*(10), 163–172. doi:10.5539/ijef.v7n10p163

Ahuja, G. (2000). The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal*, *21*(3), 317–343. doi:10.1002/(SICI)1097-0266(200003)21:3<317::AID-SMJ90>3.0.CO;2-B

Aidis, R. (2003). *Entrepreneurship and economic transition*. Tinbergen Institute discussion paper. http://www.tinbergen.nl

Aizenman, J., Jinjarak, Y., & Park, D. (2013). Capital flows and economic growth in the era of financial integration and crisis, 1990–2010. *Open Economies Review*, *24*(3), 371–396. doi:10.100711079-012-9247-3

Akadiri, S. S., Akadiri, A. C., & Alola, U. V. (2019). Is there growth impact of tourism? Evidence from selected small island states. *Current Issues in Tourism*, *22*(12), 1480–1498. doi:10.1080/13683500.2017.1381947

Akadiri, S. S., Lasisi, T. T., Uzuner, G., & Akadiri, A. C. (2019). Examining the impact of globalization in the environmental Kuznets curve hypothesis: The case of tourist destination states. *Environmental Science and Pollution Research International*, *26*(12), 12605–12615. doi:10.100711356-019-04722-0 PMID:30852745

Akhter, S. H. (2004). Is globalization what it's cracked up to be? Economic freedom, corruption, and human development. *Journal of World Business*, *39*(3), 283–295. doi:10.1016/j.jwb.2004.04.007

Albright, S., & Winston, W. (2017). Business Analytics: Data Analysis and Decision Making (6th ed.). Boston, MA: Cangage Learning.

Albulescu, C. T. (2015). Do foreign direct and portfolio investments affect long-term economic growth in Central and Eastern Europe? *Procedia Economics and Finance*, *23*, 507–512. doi:10.1016/S2212-5671(15)00539-0

Aldrich, H. E., & Fiol, C. M. (1994). Fools Rush in? The Institutional Context of Industry Creation. *Academy of Management Review*, *19*(4), 645–670. doi:10.5465/amr.1994.9412190214

Alesina, A., & Weder, B. (2002). Do Corrupt Governments Receive Less Foreign Aid? *The American Economic Review*, *92*(4), 1126–1137. doi:10.1257/00028280260344669

Alfonso-Gil, J., & Vazquez-Barquero, A. (2010). Networking and innovation: Lessons from the aeronautical clusters of Madrid. *International Journal of Technology Management*, *50*(3), 337–355.

Alley, I. (2015). Private Capital Flows and Economic Growth of Sub-Saharan African Countries. *African Development Review*, *27*(4), 469–483. doi:10.1111/1467-8268.12162

Alley, I., & Poloamina, I. (2015). Private capital flow shocks and sub-Saharan African macroeconomic performance. *Journal of International Economic Studies*, *29*, 61–84.

Al-Marhubi, F. A. (2000). Corruption and inflation. *Economics Letters*, *66*(2), 199–202. doi:10.1016/S0165-1765(99)00230-X

Almeida, P., & Phene, A. (2004). Subsidiaries and knowledge creation: The influence of the MNC and host country on innovation. *Strategic Management Journal*, *25*(8-9), 847–864. doi:10.1002mj.388

Álvarez, I., & Cantwell, J. (2011). International integration and mandates of innovative subsidiaries in Spain. *Institutions and Economies*, *3*(3), 415–444.

Al-Zaman, M. S. (2020). Healthcare Crisis in Bangladesh during the COVID-19 Pandemic. *The American Journal of Tropical Medicine and Hygiene*, *103*(4), 1357–1359. doi:10.4269/ajtmh.20-0826 PMID:32828138

Andersen, P. H., & Skaates, M. A. (2004). Ensuring validity in qualitative international business research. In R. Marschan-Piekkari & C. Welch (Eds.), Handbook of qualitative research methods for international business (pp. 464–485). Massachusetts: Edward Elgar. doi:10.4337/9781781954331.00045

Andersen, R. F., & Dinesen, P. T. (2017). *Social capital in the Scandinavian countries. In Routledge Handbook of Scandinavian Politics*. Routledge.

Anderson, J., & Vakulenko, M. (2014). Upwardly mobile. *Business Strategy Review*, *25*(4), 34–39. doi:10.1111/j.1467-8616.2014.01118.x

Andersson, K. P., & Ostrom, E. (2008). Analyzing decentralized resource regimes from a polycentric perspective. *Policy Sciences*, *41*(1), 71–93. doi:10.100711077-007-9055-6

Andersson, S., Evers, N., & Gliga, G. (2018). Entrepreneurial marketing and born global internationalization in China. *Qualitative Market Research*, *21*(2), 202–231. doi:10.1108/QMR-11-2016-0115

Andersson, S., Evers, N., & Griot, C. (2013). Local and international networks in small firm internationalization: Cases from the Rhône-Alpes medical technology regional cluster. *Entrepreneurship and Regional Development*, *25*(9-10), 867–888. doi:10.1080/08985626.2013.847975

Anetor, F. O. (2019). Economic growth effect of private capital inflows: A structural VAR approach for Nigeria. *Journal of Economic Development*, *21*(1), 18–21.

Anetor, F. O. (2020a). Financial development threshold, private capital inflows and economic growth. *International Journal of Development Issues*, *19*(1), 77–92. doi:10.1108/IJDI-06-2019-0099

Anetor, F. O. (2020b). Human capital threshold, foreign direct investment and economic growth: Evidence from sub-Saharan Africa. *International Journal of Development Issues*, *19*(3), 323–337. doi:10.1108/IJDI-01-2020-0014

Anetor, F. O. (2020c). Foreign capital inflows, financial development and growth in Nigeria: A structural VAR approach. *Journal of Developing Areas*, *54*(3), 69–86. doi:10.1353/jda.2020.0025

Anser, M. K., Yousaf, Z., Nassani, A. A., Abro, M. M. Q., & Zaman, K. (2020). International tourism, social distribution, and environmental Kuznets curve: Evidence from a panel of G-7 countries. *Environmental Science and Pollution Research International*, *27*(3), 2707–2720. doi:10.100711356-019-07196-2 PMID:31836988

Ansoff, H. I. (1957). Strategies for diversification. *Harvard Business Review*, *35*(5), 113–124.

Anthony, L. (2019). *AntConc (Version 3.5.8)* [Computer Software]. Tokyo, Japan: Waseda University. Retrieved November 15, 2019, from Software website: https://www.laurenceanthony.net/software/antconc/

Antonakas, N. P., Giokas, A. E., & Konstantopoulos, N. (2013). Corruption in Tax Administration: Interviews with Experts. *Procedia: Social and Behavioral Sciences*, *73*(1), 581–589. doi:10.1016/j.sbspro.2013.02.094

Aracıoğlu, B., Demirhan, D., Tatarlar, C. D., & Zalluhoğlu, A. E. (2016). Tüm boyutlarda girişimcilik. In A. Ö. Dedeoğlu (Ed.). *Hümanist Kitap Yayıncılık* [Lexical characteristics of Turkish language]. Academic Press.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277–297. doi:10.2307/2297968

Argyres, N., Bigelow, L., & Nickerson, J. A. (2015). Dominant designs, innovation shocks, and follower's dilemma. *Strategic Management Journal*, *36*(2), 216–234. doi:10.1002mj.2207

Arthur, M. M. (2003). Share Price Reactions to Work-family Initiatives: An Institutional Perspective. *Academy of Management Journal*, *46*(4), 497–505.

Arvanitis, S., & Bolli, T. (2013). A Comparison of National and International Innovation Cooperation in Five European Countries. *Review of Industrial Organization*, *43*(3), 163–191. doi:10.100711151-012-9348-6

Aschhoff, B., Crass, D., Cremers, K., Grimpe, C., Rammer, C., Brandes, F., & Montalvo, C. (2010). *European competitiveness in key enabling technologies*. Retrieved from ZEW Manheim.

Asiedu, E., & Freeman, J. (2009). The effect of corruption on investment growth: Evidence from firms in Latin America, Sub-Saharan Africa, and transition countries. *Review of Development Economics*, *13*(2), 200–214. doi:10.1111/j.1467-9361.2009.00507.x

Aslam, M. F., Hassan, T., & Shami, T. A. (2005). Re-engineering of systems operation; A solution to the challenges in the deregulated market environment-I. *Proceedings of the 5th WSEAS Int. Conf. on Power Systems and Electromagnetic Compatibility*, 460-465.

Asongu, S. (2014). Globalization (fighting), corruption and development: How are these phenomena linearly and nonlinearly related in wealth effects? *Journal of Economic Studies (Glasgow, Scotland)*, *14*(3), 346–369. doi:10.1108/JES-04-2012-0048

Aspelund, A., Azari, M. J., Aglen, A. F., & Graff, S. G. (2017). The birth and development of a born global industry: The case of microelectronics in Norway. *Journal of International Entrepreneurship*, 1–27. doi:10.100710843-017-0206-3

Asselin, A., Rabaud, S., Catalan, C., Leveque, B., L'Haridon, J., Martz, P., & Neveux, G. (2020). Product Biodiversity Footprint – A novel approach to compare the impact of products on biodiversity combining Life Cycle Assessment and Ecology. *Journal of Cleaner Production*, *248*, 248. doi:10.1016/j.jclepro.2019.119262

Aston, G. (1997). *Small and large corpora in language learning*. Retrieved February 28, 2020, from Scuola superiore di lingue moderne per interpreti e traduttori Università di Bologna website: https://www.sslmit.unibo.it/~guy/wudj1.htm

AttilaJ. (2020). Corruption, Globalization and the Outbreak of COVID-19. doi:10.2139srn.3742347

Avriel, M., Pri-Zan, H., Meiri, R., & Peretz, A. (2004). Opti-money at Bank Hapoalim: A model-based investment decision-support system for individual customers. *Interfaces*, *34*(1), 39–50. doi:10.1287/inte.1030.0061

Ayadi, F. S., & Ayadi, F. O. (2008). The impact of external debt on economic growth: A comparative study of Nigeria and South Africa. *Journal of Sustainable Development in Africa*, *10*(3), 234–264.

Aycan, Z., Kanungo, R., Mendonca, M., Yu, K., Deller, J., Stahl, G., & Kurshid, A. (2000). Impact of culture on human resource management practices: A 10-country comparison. *Applied Psychology*, *49*(1), 192–221. doi:10.1111/1464-0597.00010

Azam, M., Alam, M., & Hafeez, M. H. (2018). Effect of tourism on environmental pollution: Further evidence from Malaysia, Singapore and Thailand. *Journal of Cleaner Production*, *190*(1), 330–338. doi:10.1016/j.jclepro.2018.04.168

Bach, W., & Gössling, S. (1996). Climatical and ecological impacts of air traffic. *Geographische Rundschau*, *48*, 54–59.

Baghebo, M., & Apere, T. O. (2014). Foreign portfolio investment and economic growth in Nigeria. *International Journal of Business and Social Science*, *5*(11), 108–115.

Baharumshah, A. Z., Slesman, L., & Devadason, E. S. (2017). Types of foreign capital inflows and economic growth: New evidence on role of financial markets. *Journal of International Development*, *29*(6), 768–789. doi:10.1002/jid.3093

Bahoo, S., Alon, I., & Paltrinieri, A. (2020). Corruption in international business: A review and research agenda. *International Business Review*, *29*(4), 101660. doi:10.1016/j.ibusrev.2019.101660

Bai, C., & Sarkis, J. (2014). Determining and applying sustainable supplier key performance indicators. *Supply Chain Management*, *19*(3), 275–291. doi:10.1108/SCM-12-2013-0441

Bain, J. S. (1968). *Industrial organization* (2nd ed.). Hoboken, NJ: Wiley.

Balli, E., Sigeze, C., Manga, M., Birdir, S., & Birdir, K. (2019). The relationship between tourism, CO2 emissions and economic growth: A case of Mediterranean countries. *Asia Pacific Journal of Tourism Research*, *24*(3), 219–232. doi:10.1080/10941665.2018.1557717

Balsalobre-Lorente, D., Driha, O. M., Shahbaz, M., & Sinha, A. (2020). The effects of tourism and globalization over environmental degradation in developed countries. *Environmental Science and Pollution Research International*, *27*(7), 7130–7144. doi:10.100711356-019-07372-4 PMID:31879881

Bansal, P., & Roth, K. (2000). Why companies go green: A model of ecological responsiveness. *Academy of Management Journal*, *43*(4), 717–736.

Barabasi, A. L. (2002). Linked: The new science of networks. New York City: Perseus Press.

Barnes, D. (Ed.). (2001). Understanding business: processes. Business & Economics, 119.

Barnes, D. (2001). Research methods for the empirical investigation of the process of formation of operations strategy. *International Journal of Operations & Production Management*, *21*(8), 1076–1095. doi:10.1108/EUM0000000005586

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. doi:10.1177/014920639101700108

Basyal, D. K., Poudyal, N., & Seo, J. W. (2018). Does E-government reduce corruption? Evidence from a heterogeneous panel data model. *Transforming Government: People. Process and Policy*, *12*(2), 134–154.

Bauhr, M. (2017). Need or greed? Conditions for collective action against corruption. *Governance: An International Journal of Policy, Administration and Institutions*, *30*(4), 561–581. doi:10.1111/gove.12232

Bayar, Y. (2020). Globalization and socio-economic development in post-transition European Union countries: Panel causality and regression analyses. *Eastern Journal of European Studies*, *11*(1), 45–61.

Bayar, Y., & Sasmaz, M. U. (2019). Foreign borrowing, foreign direct investment inflows and economic growth in European Union transition economies. *Eastern Journal of European Studies*, *10*(2), 107–125.

Becken, S., Whittlesea, E., Loehr, J., & Scott, D. (2020). Tourism and climate change: Evaluating the extent of policy integration. *Journal of Sustainable Tourism*, *28*(10), 1603–1624. doi:10.1080/09669582.2020.1745217

Belderbos, R., Carree, M., Lokshin, B., & Fernández Sastre, J. (2015). Inter-temporal patterns of R&D collaboration and innovative performance. *The Journal of Technology Transfer*, *40*(1), 123–137. doi:10.100710961-014-9332-4

Bell, V., & Cooper, S. (2015). Acquisition of knowledge in networking for internationalisation. In A. Groen, G. Cook, & P. van der Sijde (Eds.), New technology-based firms in the new millennium (vol. 11, pp. 29–53). Bingley: Emerald. doi:10.1108/S1876-022820150000011010

Bella, G. (2018). Estimating the tourism induced environmental Kuznets curve in France. *Journal of Sustainable Tourism*, *26*(12), 2043–2052. doi:10.1080/09669582.2018.1529768

Bellido, H., Olmos, L., & Román-Aso, J. A. (2021). The influence of government ideology on corruption: The impact of the Great Recession. *Economics and Politics*, 1–32.

Bell, J., McNaughton, R., & Young, S. (2001). 'Born-again global' firms – An extension to the 'born global' phenomenon. *Journal of International Management*, *7*(3), 173–189. doi:10.1016/S1075-4253(01)00043-6

Ben Jebli, M., Ben Youssef, S., & Apergis, N. (2019). The dynamic linkage between renewable energy, tourism, CO2 emissions, economic growth, foreign direct investment, and trade. *Latin American Economic Review*, *28*(1), 2. doi:10.118640503-019-0063-7

Beneito, P. (2006). The innovative performance of in-house and contracted R&D in terms of patents and utility models. *Research Policy*, *35*(4), 502–517. doi:10.1016/j.respol.2006.01.007

Benton, L. (1990). High-tech Cottage Industry? Productive decentralization in Madrid's Electronics Industry. In L. Benton (Ed.), *Invisible Factories*. University of New York.

Berggren, S. (2017). *The Koster-Väderöfjord*. Western Sweden.

Bergquist, A.-K., Söderholm, K., Kinneryd, H., Lindmark, M., & Söderholm, P. (2013). Command-and-control revisited: Environmental compliance and technological change in Swedish industry 1970-1990. *Ecological Economics*, *85*(1), 6–19.

Berners-Lee, T. (2000). *Weaving the Web: The original design and ultimate destiny of the world wide web*. New York: HarperCollins Publishers LLC.

Bhaskar, H. L. (2014). *BPR as a quality improvement tool, Handbook of Management, Technology and Social Sciences*. SEMS Publication.

Bhaskar, H. L., & Singh, R. P. (2014). Business process re-engineering: A recent review. *Global Journal of Business Management*, *8*(2), 24–51.

Bilginer, F. (2017). Within the framework of the global entrepreneurship index the global entrepreneurship development in Turkey: A Theoretical Perspective. *Uluslararası Ticaret ve Ekonomi Araştırmaları Dergisi*, *1*(1), 29–46. doi:10.30711/utead.310378

Binh, T. T. C., & Linh, N. M. (2013). Supplier system and knowledge transfer within the production networks of electronics MNCs in Vietnam. *Asian Journal of Technology Innovation, 21*(sup1), 119-138. doi:10.1080/19761597.2013.819237

Bitektine, A., & Haack, P. (2015). The ‘macro’ and the ‘micro’ of legitimacy: Toward a multilevel theory of the legitimacy process. *Academy of Management Review*, *40*(1), 49–75. doi:10.5465/amr.2013.0318

Bjørgum, Ø., Moen, Ø., & Madsen, T. K. (2013). New ventures in an emerging industry: Access to and use of international resources. *International Journal of Entrepreneurship and Small Business*, *20*(2), 233–253. doi:10.1504/IJESB.2013.056281

Blake, C. H., & Martin, C. G. (2002, April). Combating Corruption: Re-examining the Role of Democracy. In *Annual Meeting of the Midwest Political Science Association, Chicago, April* (pp. 25-28). Academic Press.

Bohman, H., & Boter, H. (1980). *Hur styrs mindre och medelstora företag*. Stockholm: Arbetslivscentrum.

Bojanic, D. C., & Warnick, R. B. (2020). The Relationship between a Country’s Level of Tourism and Environmental Performance. *Journal of Travel Research*, *59*(2), 220–230. doi:10.1177/0047287519827394

Boland, A., Cherry, M. G., & Dickson, R. (Eds.). (2013). Doing a systematic review: A student’s guide. New York: Sage Publications.

Bosma, N., Hill, S., Ionescu-Somers, A., Kelley, D., Levie, J., & Tarnawa, A. (2019). Global entrepreneurship monitor (GEM) 2019/2020 Global Report. Academic Press.

Bosma, N., & Kelley, D. (2018). *Global entrepreneurship monitor (GEM) 2018/2019 Global Report*. Gráfica Andes.

Boukherroub, T., D’amours, S., & Rönnqvist, M. (2018). Sustainable forest management using decision theaters: Rethinking participatory planning. *Journal of Cleaner Production*, *179*, 567–580. doi:10.1016/j.jclepro.2018.01.084

Bourgeois, L. III, & Eisenhardt, K. (1988). Strategic decision processes in high velocity environments: Four cases in the microcomputer industry. *Management Science*, *34*(7), 816–835. doi:10.1287/mnsc.34.7.816

Bouzid, B. N. (2016). Dynamic relationship between corruption and youth unemployment: empirical evidences from a system GMM approach. *World Bank Policy Research Working Paper*, (7842).

Brauer, M. F., & Schmidt, S. M. (2006). Exploring strategy implementation consistency over time: The moderating effects of industry velocity and firm performance. *The Journal of Management and Governance*, *10*(2), 205–226. doi:10.100710997-006-0002-2

Brauer, M. F., & Wiersema, M. F. (2012). Industry Divestiture Waves: How a firm’s position influences investor returns. *Academy of Management Journal*, *55*(6), 1472–1492. doi:10.5465/amj.2010.1099

Brennen, J. S., & Kreiss, D. (2016). Digitalization. In K. B. Jensen, E. W. Rothenbuhler, J. D. Pooley, & R. T. Craig (Eds.), *The International Encyclopedia of Communication Theory and Philosophy* (pp. 556–566). Wiley-Blackwell. doi:10.1002/9781118766804.wbiect111

Broadband Commission. (2020). *Digital entrepreneurship*. https://www.broadbandcommission.org/workinggroups/Pages/Digital-Entrepreneurship.aspx

Broszeit, S., Beaumont, N. J., Hooper, T. L., Somerfield, P. J., & Austen, M. C. (2019). Developing conceptual models that link multiple ecosystem services to ecological research to aid management and policy, the UK marine example. *Marine Pollution Bulletin*, *141*, 236–243. Advance online publication. doi:10.1016/j.marpolbul.2019.02.051 PMID:30955730

Bruckmeier, K., & Höj Larsen, C. (2008). Swedish coastal fisheries-From conflict mitigation to participatory management. *Marine Policy*, *32*(2), 201–211. doi:10.1016/j.marpol.2007.09.005

Brügger, N. (2015). *A brief history of Facebook as a media text: The development of an empty structure*. doi:10.5210/fm.v20i5.5423

Brynjolfsson, E., & McAfee, A. (2016). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: W. W. Norton & Company, Inc.

Bucolo, S. (2015). *Are we there yet?* Amsterdam: BIS Publishers.

Buiren, K. V., Veld, D. & Voort, J. V. D. (2019) State Aid and Competition: Application of Social Welfare Criterion to State Aid. *Journal of Industry, Competition and Trade*, *19*(1).

Buller, P. F., Kohls, J. J., & Anderson, K. S. (2000). When ethics collide: Managing conflicts across cultures. *Organizational Dynamics*, *28*(4), 52–66. doi:10.1016/S0090-2616(00)00005-X

Burnard, P. (1991). A method of analysing interview transcripts in qualitative research. *Nurse Education Today*, *11*(6), 461–466. doi:10.1016/0260-6917(91)90009-Y PMID:1775125

Business Sweden. (2020). Singapore Business Climate Survey 2020. In Business Sweden and SwedCham. Singapore: Author.

Butler, J. R. A., Young, J. C., McMyn, I. A. G., Leyshon, B., Graham, I. M., Walker, I., Baxter, J. M., Dodd, J., & Warburton, C. (2015). Evaluating adaptive co-management as conservation conflict resolution: Learning from seals and salmon. *Journal of Environmental Management*, *160*, 212–225. doi:10.1016/j.jenvman.2015.06.019 PMID:26144563

Butler, R. W. (2000). Tourism and the environment: A geographical perspective. *Tourism Geographies*, *2*(3), 337–358. doi:10.1080/14616680050082553

Byrkjeflot, H. (1997). *Modernisering og ledelse: Om samfunnsmessige betingelser for demokratisk lederskap*. Retrieved from https://books.google.se/books/about/Modernisering_og_ledelse.html?id=CYQ6MwEACAAJ&redir_esc=y

Cachon, G., & Terwiesch, C. (2012). *Matching Supply with Demand: An Introduction to Operations Management*. London: McGraw-Hill/Irwin.

Calvo, A. (2019a). Sector privado y sector público en la industria española de alta tecnología: Indra. *Biblio3w, 24*(1259), 1-36.

Calvo, A. (2019). Consolidation and rationalization of the public companies in Spain: The information and communication technologies (ICT) holding. *Journal of Evolutionary Studies in Business*, *4*(1), 142–179.

Calvo, A. (2019b). World telecommunications equipment industry from the national champions to outsourcing: The case of ALCATEL. *The International Journal of Business Management and Technology*, *3*(6), 130–152.

Cameron, N. (2017). *Will Robots Take Your Job?* Cambridge: Polity Press.

Candan, H. (2011). Osmanlı'dan Günümüze Türk Topraklarında Girişimcilik Serüvenine Dair Bir Değerlendirme. *Kahramanmaraş Sütçü İmam Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *1*(2), 157–174.

Cannon, A. R., & John, C. H. S. (2007). Measuring environmental complexity: A theoretical and empirical assessment. *Organizational Research Methods*, *10*(2), 296–321. doi:10.1177/1094428106291058

Cansız, M. (2013). *Türkiye'nin yenilikçi girişimcileri: teknoloji geliştirme bölgeleri örneği, sosyal sektörler ve Koordinasyon Genel Müdürlüğü Araştırma Geliştirme ve Girişimcilik Daire Başkanlığı* (Publication No: 2850) [Lexical characteristics of Turkish language]. Türkiye Cumhuriyeti Kalkınma Bakanlığı.

Cantwell, J. (1995). Innovation in a global world Globalisation does not kill the need for national policies. *New Economy*, *2*(2), 66–70. doi:10.1111/j.1468-0041.1995.tb00054.x

Carboni, O. A. (2013). Heterogeneity in R&D cooperation: An empirical investigation. *Structural Change and Economic Dynamics*, *25*, 48–59. doi:10.1016/j.strueco.2013.02.003

Carlzon, J. (1989). *Moments of Truth*. Retrieved from https://www.amazon.com/Moments-Truth-Jan-Carlzon/dp/0060915803

Carvalheira, A., & Moreira, A. C. (2016). Searching for Opportunities and Trust in International Markets. Entrepreneurial Perspective of a Traditional Industry SME. In L. C. Carvalho (Ed.), Handbook of research on entrepreneurial success and its impact on regional development (pp. 675–701). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-9567-2.ch028

Castellani, D., & Zanfei, A. (2002). Multinational experience and the creation of linkages with local firms: Evidence from the electronics industry. *Cambridge Journal of Economics*, *26*(1), 1–25. doi:10.1093/cje/26.1.1

Castrogiovanni, G. J. (1991). Environmental munificence: A theoretical assessment. *Academy of Management Review*, *16*(3), 452–565.

Castrogiovanni, G. J. (2002). Organization task environments: Have they changed fundamentally over time? *Journal of Management*, *28*(2), 129–150. doi:10.1177/014920630202800201

Caves, R., Fortunato, M., & Chemawat, P. (1984). The decline of dominant firms: 1905-1929. *The Quarterly Journal of Economics*, *99*(3), 523–546. doi:10.2307/1885963

Cesinger, B., Danko, A., & Bouncken, R. (2012). Born globals: (almost) 20 years of research and still not 'grown up'? *International Journal of Entrepreneurship and Small Business*, *15*(2), 171–190. doi:10.1504/IJESB.2012.045203

Chadwick, C., Super, J. F., & Kwon, K. (2015). Resource orchestration in practice: CEO emphasis on SHRM, commitment-based HR systems, and firm performance. *Strategic Management Journal*, *36*(3), 360–376. doi:10.1002mj.2217

Chandler, A. (1977). *The visible hand*. Belknap Press of Harvard University Press.

Chandler, A. (1990). *Scale and Scope*. Belknap Press of Harvard University Press.

Chang, J. S., & Chang, W. H. (2014). Analysis of fraudulent behavior strategies in online auctions for detecting latent fraudsters. *Electronic Commerce Research and Applications*, *13*(2), 79–97. doi:10.1016/j.elerap.2013.10.004

Chang, S. J., & Wu, B. (2014). Institutional barriers and industry dynamics. *Strategic Management Journal*, *35*(8), 1103–1123. doi:10.1002mj.2152

Charnes, A., & Cooper, W. W. (1957). Management Models and Industrial Applications of Linear Programming. *Management Science*, *4*(1), 38–91. doi:10.1287/mnsc.4.1.38

Chase, R., Robert, F., & Nicholas, J. (2006). *Operations Management for Competitive Advantage* (11th ed.). London: McGraw-Hill/Irwin.

Chatain, O. (2014). How do strategic factor markets respond to rivalry in the product market? *Strategic Management Journal*, *35*(13), 1952–1971. doi:10.1002mj.2188

Chatman, J. A., & Jehn, K. A. (1994). Assessing the Relationship between Industry Characteristics and Organizational Culture: How different can you be? *Academy of Management Journal*, *37*(3), 522–553. doi:10.5465/256699

Chengcai, T., Qianqian, Z., Nana, Q., Yan, S., Shushu, W., & Ling, F. (2017). A review of green development in the tourism industry. *Journal of Resources and Ecology*, *8*(5), 449–459. doi:10.5814/j.issn.1674-764x.2017.05.002

Chen, M., & Hambrick, D. (1995). Speed, stealth and selective attack: How small firms differ from large firms in competitive behavior. *Academy of Management Journal*, *38*(2), 453–482. doi:10.5465/256688

Cheraghalikhani, A., Khoshalhan, F., & Mokhtari, H. (2019). Aggregate production planning: A literature review and future research directions. *International Journal of Industrial Engineering Computations*, *10*, 309–330. doi:10.5267/j.ijiec.2018.6.002

Cherif, E., & Grant, D. (2014). Analysis of e-business models in real estate. *Electronic Commerce Research*, *14*(1), 25–50. doi:10.100710660-013-9126-z

Chetty, S. (1996). The case study method for research in small- and medium-sized firms. *International Small Business Journal*, *15*(l), 73–85. doi:10.1177/0266242696151005

Chetty, S., & Campbell-Hunt, C. (2003). Paths to internationalisation among small to medium-sized firms: A global versus regional approach. *European Journal of Marketing*, *37*(5/6), 796–820. doi:10.1108/03090560310465152

Chiang, A., & Wainwright, K. (2005). *Fundamental Methods of Mathematical Economics*. London: McGraw-Hill/Irwin.

Chi, J., & Sun, L. (2018). Network position, technological distance and firm's cooperation innovation. *American Journal of Industrial and Business Management*, *8*(11), 2180–2190. doi:10.4236/ajibm.2018.811145

Child, I. (1977). Organization design and performance: Contingency theory and beyond. *Organization and Administrative Sciences*, *8*, 169–183.

Child, J. (1972). Organizational structure, environment and performance: The role of strategic choice. *Sociology*, *6*(1), 1–22. doi:10.1177/003803857200600101

Chitakunye, P., Saruchera, F., Phiri, M., Takhar-Lail, A., & Derera, E. (2014). Consumer Misinformation: the Anti-Consumption of Green Products. *ACR North American Advances*. Retrieved from https://www.researchgate.net/profile/Fanny_Saruchera/publication/329029549_Consumer_Misinformation_the_Anti-Consumption_of_Green_Products/links/5dc990ef299bf1a47b2facef/Consumer-Misinformation-the-Anti-Consumption-of-Green-Products.pdf

Chitakunye, P., Saruchera, F., Derera, E., & Tarkhar-Lail, A. (2014). Managing Consumer Mythology: The Green Consumption of E10 Fuel. *Mediterranean Journal of Social Sciences*, *5*(20), 1098–1098. doi:10.5901/mjss.2014.v5n20p1098

Choi, J. P., & Thum, M. (2005). Corruption and the shadow economy. *International Economic Review*, *46*(3), 817–836. doi:10.1111/j.1468-2354.2005.00347.x

Chong, A., De La, O. A. L., Karlan, D., & Wantchekon, L. (2015). Does corruption information inspire the fight or quash the hope? A field experiment in Mexico on voter turnout, choice, and party identification. *The Journal of Politics*, *77*(1), 55–71. doi:10.1086/678766

Choong, C. K., Baharumshah, A. Z., Yusop, Z., & Habibullah, M. S. (2010). Private capital flows, stock market and economic growth in developed and developing countries: A comparative analysis. *Japan and the World Economy*, *22*(2), 107–117. doi:10.1016/j.japwor.2009.07.001

Chopra, S., & Meindl, P. (2016). Supply Chain Management (Global Edition). New York City: Pearson.

Christensen, C., & Raynor, M. (2013). The innovator's solution: Creating and sustaining successful growth. Brighton, Massachusetts: Harvard Business Review Press.

Christensen, J. (2012). The hidden trillions: Secrecy, corruption, and the offshore interface. *Crime, Law, and Social Change*, *57*(3), 325–343. doi:10.100710611-011-9347-9

Christensen, J. F., Olesen, M. H., & Kjaer, J. S. (2005). The industrial dynamics of Open Innovation - Evidence from the transformation of consumer electronics. *Research Policy*, *34*(10), 1533–1549. doi:10.1016/j.respol.2005.07.002

Chua, C. K., & Leong, K. F. (2014). 3D Printing and Additive Manufacturing: Principles and Applications (4th ed.). Singapore: World Scientific Publishing Company.

Ciocchini, F., Durbin, E., & Ng, D. T. (2003). Does corruption increase emerging market bond spreads? *Journal of Economics and Business*, *55*(5-6), 503–528. doi:10.1016/S0148-6195(03)00052-3

Ciravegna, L., & Giuliani, E. (2007). MNC-dominated clusters and the upgrading of domestic suppliers: the case of Costa Rican electronics and medical device industries. In R. Leoncini & S. Montresor (Eds.), *Dynamic Capabilities between Firm Organization and Local Systems of Production* (pp. 236–263). Routledge.

Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: The two faces of R & D. *Economic Journal (London)*, *99*(397), 569–596. doi:10.2307/2233763

College Dictionary. (2010). Random House Kernerman Webster's College Dictionary. K Dictionaries Ltd. Random House, Inc.

Collins English Dictionary. (2012). *Collins English Dictionary: Complete and Unabridged*. HarperCollins Publishers.

Contractor, F. J., & Mudambi, S. M. (2008). The influence of human capital investment on the exports of services and goods: An analysis of the top 25 services outsourcing countries. *Management International Review*, *48*(4), 433–445. doi:10.100711575-008-0025-9

Cordeiro, C. M. (2014). Innovation, organization transformation and human resource management: A discourse analysis study of Swedish managers in Singapore. *ICMIT 2014 - 2014 IEEE International Conference on Management of Innovation and Technology*. 10.1109/ICMIT.2014.6942448

Cordeiro-Nilsson, C. M. (2009). *Swedish management in Singapore: a discourse analysis study* (University of Gothenburg). Retrieved from https://gupea.ub.gu.se/handle/2077/20233

Cordeiro-Nilsson, C. M. (2011). Developing global-minded leadership: A Swedish perspective. *Singapore Management Review*. Retrieved from https://www.scopus.com/inward/record.url?eid=2-s2.0-84865981987&partnerID=MN8TOARS

Cordis, A. S., & Warren, P. L. (2014). Sunshine as a disinfectant: The effect of state Freedom of Information Act laws on public corruption. *Journal of Public Economics*, *115*, 18–36. doi:10.1016/j.jpubeco.2014.03.010

Cornelissen, J. P., Durand, R., Fiss, P. C., Lammercs, J. C., & Varra, E. (2015). Putting communication front and center in institutional theory and analysis. *Academy of Management Review*, *40*(1), 10–27. doi:10.5465/amr.2014.0381

Coulibaly-Lingani, P., Tigabu, M., Savadogo, P., & Odén, P. C. (2014). Participatory forest management in Burkina Faso: Members' perception of performance. *Journal of Forestry Research*, *25*(3), 637–646. doi:10.100711676-014-0502-x

Coviello, N. (2006). The network dynamics of international new ventures. *Journal of International Business Studies*, *37*(5), 713–731. doi:10.1057/palgrave.jibs.8400219

Coviello, N. (2015). Re-thinking research on born globals. *Journal of International Business Studies*, *46*(1), 17–26. doi:10.1057/jibs.2014.59

Coviello, N., & Munro, H. (1997). Network relationships and the internationalisation process of small software firms. *International Business Review*, *6*(4), 361–386. doi:10.1016/S0969-5931(97)00010-3

Cowles, B. (2015). *Question mark culture: how culture affects entrepreneurship at Amazon* [Unpublished doctoral dissertation]. Christian University, Texas.

Cozza, C., Perani, G., & Zanfei, A. (2018). Multinationals and R&D cooperation: Empirical evidence from the Italian R&D survey. *Economics and Politics*, *35*(2), 601–621. doi:10.100740888-018-0104-8

Cozza, C., & Zanfei, A. (2016). Firm heterogeneity, absorptive capacity and technical linkages with external parties in Italy. *The Journal of Technology Transfer*, *41*(4), 872–890. doi:10.100710961-015-9404-0

Cruz-Castro, L., Holl, A., Rama, R., & Sanz-Menéndez, L. (2018). Economic crisis and company R&D in Spain: Do regional and policy factors matter? *Industry and Innovation*, *25*(8), 729–751. doi:10.1080/13662716.2017.1355231

Cundill, G., & Fabricius, C. (2009). Monitoring in adaptive co-management : Toward a learning based approach. *Journal of Environmental Management*, *90*(11), 3205–3211. doi:10.1016/j.jenvman.2009.05.012 PMID:19520488

Curty, R. G., & Zhang, P. (2013). Website features that gave rise to social commerce: A historical analysis. *Electronic Commerce Research and Applications*, *12*(4), 260–279. doi:10.1016/j.elerap.2013.04.001

d'Agostino, G., Dunne, J. P., & Pieroni, L. (2016). Corruption and growth in Africa. *European Journal of Political Economy*, *43*(1), 71–88. doi:10.1016/j.ejpoleco.2016.03.002

Dachs, B., Ebersberger, B., & Lööf, H. (2008). The innovative performance of foreign-owned enterprises in small open economies. *The Journal of Technology Transfer*, *33*(4), 393–406. doi:10.100710961-007-9058-7

Dal, N. E., & Şahin, Ö. (2018). Elektronik ticarette güven oluşturan faktörlerin satınalma niyeti ile ilişkisi: Trendyol alışveriş sitesi müşterileri ile bir araştırma. *Avrasya Sosyal ve Ekonomik Araştırmalar Dergisi*, *5*(12), 240–259.

Datta, D. K., Guthrie, J. P., & Rajagopalan, N. (2002). Different industries, different CEOs? An empirical study of CEO career specialization. *Human Resource Planning*, *25*, 14–25.

Datta, D. K., Guthrie, J. P., & Wright, P. M. (2005). Human Resource Management and Labor Productivity: Does Industry Matter? *Academy of Management Journal*, *48*(1), 135–145. doi:10.5465/amj.2005.15993158

Davidson, E., & Vaast, E. (2010). Digital entrepreneurship and its sociomaterial enactment. *In Proceedings of the 43rd Hawaii International Conference on System Sciences*. IEEE Computer Society.

Davies, S. (2019). *Smilelove & SmileDirectClub discuss the benefit of 3D printing molds for clear aligners.* Retrieved from https://www.tctmagazine.com/3d-printing-news/aligner-start-ups-show-their-teeth-smilelove-smiledirectclub/

Davis, S. J., Caldeira, K., & Matthews, H. D. (2010). Future CO2 Emissions and Climate Change from Existing Energy Infrastructure. *Science*, *329*(5997), 1330–1333. doi:10.1126cience.1188566 PMID:20829483

De Faria, P., Lima, F., & Santos, R. (2010). Cooperation in innovation activities: The importance of partners. *Research Policy*, *39*(8), 1082–1092. doi:10.1016/j.respol.2010.05.003

de Vita, G., Katircioglu, S., Altinay, L., Fethi, S., & Mercan, M. (2015). Revisiting the environmental Kuznets curve hypothesis in a tourism development context. *Environmental Science and Pollution Research International*, *22*(21), 16652–16663. doi:10.100711356-015-4861-4 PMID:26081781

Dean, J. W. Jr, & Bowen, D. E. (1994). Management Theory and Total Quality: Improving Research and Practice through Theory Development. *Academy of Management Review*, *19*(3), 392–418. doi:10.5465/amr.1994.9412271803

Dearlove, D., & Crainer, S. (2014). Mobilising value: The turkcell way. *Business Strategy Review*, *25*(1), 38–44. doi:10.1111/j.1467-8616.2014.01026.x

Debbiche, I. (2020). Foreign Capital Inflows and Economic Growth in GCC Countries. *International Journal of Economics and Financial Issues*, *10*(5), 203–210. doi:10.32479/ijefi.10319

Debter, L. (2019). *SmileDirectClub Gets Chilly Reception In Latest Billionaire-Minting IPO*. Retrieved from https://www.forbes.com/sites/laurendebter/2019/09/11/smiledirectclub-ipo/#2e60e0556aca

Dedecca, J. G., Hakvoort, R. A., & Ortt, J. R. (2016). Market strategies for offshore wind in Europe: A development and diffusion perspective. *Renewable & Sustainable Energy Reviews*, *66*, 286–296. doi:10.1016/j.rser.2016.08.007

Delacroix, E., Parguel, B., & Benoit-Moreau, F. (2019). Digital subsistence entrepreneurs on Facebook. *Technological Forecasting & Social Change, 146*, 887–899. . techfore.2018.06.018 doi:10.1016/j

Delic, M., Eyers, D. & Mikulic, J. (2019). Additive manufacturing: empirical evidence for supply chain integration and performance from the automotive industry. *Supply Chain Management: An International Journal, 24*(5), 604–621. DOI doi:10.1108/SCM-12-2017-0406

Deliversky, J. (2016). Preventing corruption in the education system. *Journal of Educational and Instructional Studies in the World, 6*(1), 141-146.

Della, P. D., & Vannucci, A. (2016). *The hidden order of corruption: An institutional approach*. Routledge.

Den Hertog, C. (2014). Better value chains: A matrix for competitive advantage. *The Journal of Business Strategy*, *35*(5), 43–48. doi:10.1108/JBS-04-2014-0042

Denison, D. R. (1990). *Corporate culture and organizational effectiveness*. John Wiley & Sons.

Department of Statistics Singapore. (2020). *Statistics Singapore - Reference*. Retrieved August 20, 2020, from Statistics Singapore website: https://www.singstat.gov.sg/publications/reference

Dess, G. G., & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative Science Quarterly*, *29*(1), 52–73. doi:10.2307/2393080

Dess, G. G., & Robinson, R. B. Jr. (1984). Measuring organizational performance in the absence of objective measures: The case of the privately-held firm and conglomerate business unit. *Strategic Management Journal*, *5*(3), 265–273. doi:10.1002mj.4250050306

Dewar, R. D., & Dutton, J. E. (1986). The adoption of radical and incremental innovations: An empirical analysis. *Management Science*, *32*(11), 1422–1433. doi:10.1287/mnsc.32.11.1422

Dhont-Peltrault, E., & Pfister, E. (2011). R&D cooperation versus R&D subcontracting: Empirical evidence from French survey data. *Economics of Innovation and New Technology*, *20*(4), 309–341. doi:10.1080/10438591003669743

Di Zhang, D., & Bruning, E. (2011). Personal characteristics and strategic orientation: Entrepreneurs in canadian manufacturing companies. *International Journal of Entrepreneurial Behaviour & Research*, *17*(19), 82–103. doi:10.1108/13552551111107525

Díaz-Mora, C. (2008). What factors determine the outsourcing intensity? A dynamic panel data approach for manufacturing industries. *Applied Economics*, *40*(19), 2509–2521. doi:10.1080/00036840600970179

Diegel, O., Nordin, A., & Motte, D. (2019). A Practical Guide to Design for Additive Manufacturing. New York City: Springer. doi:10.1007/978-981-13-8281-9

Doan, T. T., Sahib, P. R., & Van Witteloostuijn, A. (2018). Lessons from the flipside: How do acquirers learn from divestitures to complete acquisitions? *Long Range Planning*, *51*(X), 252–266. doi:10.1016/j.lrp.2018.01.002

Dobni, C. B., Klassen, M., & Nelson, W. T. (2015). Innovation strategy in the US: Top executives offer their views. *The Journal of Business Strategy*, *36*(1), 3–13. doi:10.1108/JBS-12-2013-0115

Dogan, E., Seker, F., & Bulbul, S. (2017). Investigating the impacts of energy consumption, real GDP, tourism and trade on CO2 emissions by accounting for cross-sectional dependence: A panel study of OECD countries. *Current Issues in Tourism*, *20*(16), 1701–1719. doi:10.1080/13683500.2015.1119103

Dougherty, D. (2016). Free To Make: How the Maker Movement Is Changing our Schools, Our Jobs, and our Minds. Berkeley, CA: North Atlantic Books.

Driffield, N., Love, J. H., & Yang, Y. (2014). Technology sourcing and reverse productivity spillovers in the multinational enterprise: Global or regional phenomenon? *British Journal of Management*, *25*(S1), 24–41. doi:10.1111/1467-8551.12009

Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics*, *80*(4), 549–560. doi:10.1162/003465398557825

Duasa, J., & Kassim, S. H. (2009). Foreign portfolio investment and economic growth in Malaysia. *Pakistan Development Review*, *48*(2), 109–123. doi:10.30541/v48i2pp.109-123

Ductor, L., & Grechyna, D. (2015). Financial development, real sector, and economic growth. *International Review of Economics & Finance*, *37*, 393–405. doi:10.1016/j.iref.2015.01.001

Dudley, R. G., Blvd, S. W. T., & Oregon, B. (2016). *The Rotten Mango: The Effect of Corruption on International Development Projects*. Corpus ID: Political Science.

Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. *Administrative Science Quarterly*, *17*(3), 313–327. doi:10.2307/2392145

Dunne, A., & Raby, F. (2013). Speculative Everything: Design, fiction and social dreaming. Cambridge, Massachusetts: The MIT Press.

Durham, J. B. (2004). Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. *European Economic Review*, *48*(2), 285–306. doi:10.1016/S0014-2921(02)00264-7

Durukan, T. (2007). Dünden bugüne girişimcilik ve 21.yüzyılda girişimciliğin önemi. *Journal of Entrepreneurship and Development*, *1*(2), 25–38.

Dutta, M. (2018). Globalization, Corruption and Women Empowerment. *Economic Papers: A Journal of Applied Economics and Policy, 37*(3), 327-343.

Du, W. D., Pan, S. L., Zhou, N., & Ouyang, T. (2018). From a marketplace of electronics to a digital entrepreneurial ecosystem (DEE): The emergence of a meta-organization İn Zhongguancun, China. *Information Systems Journal*, *28*(6), 1158–1175. doi:10.1111/isj.12176

Dwivedi, O. P. (1967). Bureaucratic corruption in developing countries. *Asian Survey*, *7*(4), 245–253. doi:10.2307/2642478

Ebersberger, B., & Herstad, S. J. (2012). Go abroad or have strangers visit? On organizational search spaces and local linkages. *Journal of Economic Geography*, *12*(1), 273–295. doi:10.1093/jeg/lbq057

Ebersberger, B., Herstad, S. J., Iversen, E., Kirner, E., & Som, O. (2011). *Analysis of innovation drivers and barriers in support of better policies. Economic and market intelligence on innovation. Open innovation in Europe: effects, determinants and policy*. European Commission.

Efrat, K. (2014). The direct and indirect impact of culture on innovation. *Technovation*, *34*(1), 12–20. doi:10.1016/j.technovation.2013.08.003

Ehigiamusoe, K. U. (2020). Tourism, growth and environment: Analysis of non-linear and moderating effects. *Journal of Sustainable Tourism*, *28*(8), 1174–1192. doi:10.1080/09669582.2020.1729164

Ehigiamusoe, K. U., & Lean, H. H. (2019). Foreign capital inflows and economic growth in Nigeria: Any nexus? *Journal of African Business*, *20*(4), 455–471. doi:10.1080/15228916.2019.1581010

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550. doi:10.5465/amr.1989.4308385

Eleftheriadou, D. (2014), Digital entrepreneurship the EU vision, strategy and actions. *First Meeting of the Member States Board on Digital Entrepreneurship*, 1-13.

Ellero, A., & Pellegrini, P. (2014). Are traditional forecasting models suitable for hotels in Italian cities? *International Journal of Contemporary Hospitality Management*, *26*(3), 383–400. doi:10.1108/IJCHM-02-2013-0107

Elmqvist, T., Setälä, H., Handel, S. N., van der Ploeg, S., Aronson, J., Blignaut, J. N., Gómez-Baggethun, E., Nowak, D. J., Kronenberg, J., & de Groot, R. (2015). Benefits of restoring ecosystem services in urban areas. *Current Opinion in Environmental Sustainability*, *14*, 101–108. doi:10.1016/j.cosust.2015.05.001

Elo, S., Kääriäinen, M., Kanste, O. I., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *SAGE Open*, *4*(1), 1–10. doi:10.1177/2158244014522633

Eluwole, K. K., Saint Akadiri, S., Alola, A. A., & Etokakpan, M. U. (2020). Does the interaction between growth determinants a drive for global environmental sustainability? Evidence from world top 10 pollutant emissions countries. *The Science of the Total Environment*, *705*(1), 135972. doi:10.1016/j.scitotenv.2019.135972 PMID:31841901

Enderwick, P. (2005). Attracting “desirable” FDI: Theory and evidence. *Transnational Corporations*, *14*(2), 93.

Englis, P. D., & Wakkee, I. (2015). Managerial mindset and the born global firm. In A. Groen, G. Cook, & P. Van der Sijde (Eds.), *New Technology Based Firms in the New Millennium* (pp. 9–17). Emerald Publishing Limited. doi:10.1108/S1876-022820150000011009

Epstein, M. J., Buhovac, A. R., & Yuthas, K. (2015). Managing social, environmental and financial performance simultaneously. *Long Range Planning*, *48*(1), 35–45. doi:10.1016/j.lrp.2012.11.001

Erdogan, M., & Unver, M. (2015). Determinants of foreign direct investments: Dynamic panel data evidence. *International Journal of Economics and Finance*, *7*(5), 82. doi:10.5539/ijef.v7n5p82

Eriksson, N. (2017). Hospital management from a high reliability organizational change perspective: A Swedish case on Lean and Six Sigma. *International Journal of Public Sector Management*, *30*(1), 67–84. doi:10.1108/IJPSM-12-2015-0221

Errunza, V. (2001). Foreign portfolio equity investments, financial liberalization, and economic development. *Review of International Economics*, *9*(4), 703–726. doi:10.1111/1467-9396.00308

European Court of Auditors. (2019). *Big data analytics as a tool for auditors to identify and prevent fraud and corruption in public procurement.* Retrieved February 7, 2021, from https://medium.com/ecajournal/big-data-analytics-as-a-tool-for-auditors-to-identify-and-prevent-fraud-and-corruption-in-public-68184529334c

Evans, L., Cherrett, N., & Pemsl, D. (2011). Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis. *Journal of Environmental Management*, *92*(8), 1938–1949. doi:10.1016/j.jenvman.2011.03.010 PMID:21531068

Eyuboglu, K., & Uzar, U. (2020). The impact of tourism on CO2 emission in Turkey. *Current Issues in Tourism*, *23*(13), 1631–1645. doi:10.1080/13683500.2019.1636006

Ezeanyeji, C. I., & Maureen, I. (2019). Foreign Portfolio Investment on Economic Growth of Nigeria: An Impact Analysis. *International Journal of Academic Management Science Research*, *3*(3), 24–36.

Factor, R., & Kang, M. (2015). Corruption and population health outcomes: An analysis of data from 133 countries using structural equation modeling. *International Journal of Public Health*, *60*(6), 633–641. doi:10.100700038-015-0687-6 PMID:25994589

Fath, S., & Kay, A. C. (2018). Organizational Behavior and Human Decision Processes “If hierarchical then corrupt”: Exploring people’s tendency to associate hierarchy with corruption in organizations. *Organizational Behavior and Human Decision Processes*, *149*(1), 145–164. doi:10.1016/j.obhdp.2018.10.004

Feinberg, S. E., & Gupta, A. K. (2009). MNC Subsidiaries and Country Risk: Internalization as a Safeguard against weak external institutions. *Academy of Management Journal*, *52*(2), 381–399. doi:10.5465/amj.2009.37315470

Fenn, J., & Raskino, M. (2008). Mastering the Hype Cycle: How to choose the right innovation at the right time (Gartner). Brighton, Massachusetts: Harvard Business Review Press.

Fernandes, L., Simões, D., Pereira, C., & Moreira, A. C. (2019). Challenges of the internationalization strategy of a technology-based international new venture. In N. Teixeira, T. Costa, & i. Lisboa (Eds.), Handbook of Research on Entrepreneurship, Innovation, and Internalization (pp. 467-489). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-8479-7.ch018

Fernández Sastre, J. (2012). *Efectos y determinantes de la cooperación para la innovación tecnológica: un estudio empírico sobre un panel de datos de empresas localizadas en España* (Ph.D. Thesis). Universidad Autónoma de Madrid, Madrid.

Fernández-Otheo, C. M., & Myro, R. (2014). La inversión de las empresas españolas en el exterior: patrón sectorial y espacial, y rentabilidad. In R. Myro & M. E. Álvarez López (Eds.), *España en la inversión directa internacional* (pp. 245–296). Instituto de Estudios Económicos.

Ferrier, W. J. (2001). Navigating the Competitive Landscape: The drivers and consequences of competitive aggressiveness. *Academy of Management Journal*, *44*(4), 858–877.

Ferrier, W. J., Smith, K. G., & Grimm, C. M. (1999). The Role of Competitive Action in Market Share Erosion and Industry Dethronement: A Study of Industry Leaders and Challengers. *Academy of Management Journal*, *42*(4), 372–388.

Ferwerda, J., Deleanu, I., & Unger, B. (2017). Corruption in public procurement: Finding the right indicators. *European Journal on Criminal Policy and Research*, *23*(2), 245–267. doi:10.100710610-016-9312-3

Flanagin, A., Metzger, M., Pure, R., Markov, A., & Hartsell, E. (2014). Mitigating risk in ecommerce transactions: Perceptions of information credibility and the role of user-generated ratings in product quality and purchase intention. *Electronic Commerce Research*, *14*(1), 1–23. doi:10.100710660-014-9139-2

Flowerdew, J. (2009). Corpora in Language Teaching. The Handbook of Language Teaching, (November), 327–350. doi:10.1002/9781444315783.ch19

Font, X., & Tribe, J. (2001). Promoting green tourism: The future of environmental awards. *International Journal of Tourism Research*, *3*(1), 9–21. doi:10.1002/1522-1970(200101/02)3:1<9::AID-JTR244>3.0.CO;2-Q

Forbes, D. P., & Kirsch, D. A. (2011). The study of emerging industries: Recognizing and responding to some central problems. *Journal of Business Venturing*, *26*(5), 589–602. doi:10.1016/j.jbusvent.2010.01.004

Forsgren, M. (2002). The concept of learning in the Uppsala internationalization process model: A critical review. *International Business Review*, *11*(3), 257–277. doi:10.1016/S0969-5931(01)00060-9

Forty, A. (1986). *Objects of Desire: design and society since 1750*. London: Thames and Hudson.

Fosfuri, A., Lanzolla, G., & Suarez, F. F. (2013). Entry-timing strategies: The road ahead. *Long Range Planning*, *46*(4-5), 300–311. doi:10.1016/j.lrp.2013.07.001

Franco, M., & Haase, H. (2016). Internationalisation of born globals: The role of strategic alliances. *European Journal of International Management*, *10*(2), 181–201. doi:10.1504/EJIM.2016.074471

Fredrickson, J. W., Hambrick, D. C., & Baumrin, S. (1988). A Model of CEO Dismissal. *Academy of Management Review*, *13*(2), 255–270. doi:10.5465/amr.1988.4306882

Freeland, C. (2012). *Plutocrats: The Rise of the New Global Super-Rich and the Fall of Everyone Else*. Doubleday.

Fremeth, A. R., & Shaver, J. M. (2014). Strategic rationale for responding to extra-jurisdictional regulation: Evidence from firm adoption of renewable power in the US. *Strategic Management Journal*, *35*(5), 629–651. doi:10.1002mj.2118

Friesl, M., & Silberzahn, R. (2012). Challenges in Establishing Global Collaboration: Temporal, Strategic and Operational Decoupling. *Long Range Planning*, *45*(2-3), 160–181. doi:10.1016/j.lrp.2011.11.004

Frolova, I. I. (2014). Research on corruption in the education system. *Asian Social Science*, *10*(20), 21. doi:10.5539/ass.v10n20p21

Fukuda, T. (2019). Mexico's finance-growth nexus with trade openness, FDI and portfolio investment: evidence from VECM cointegration analysis. *Ecos de Economía: A Latin American*. *Journal of Applied Econometrics*, *23*(49), 29–44.

Fuller, D. B., Akinwande, A. I., & Sodini, C. G. (2017). The globalization of R&D's implications for technological capabilities in MNC home countries: Semiconductor design offshoring to China and India. *Technological Forecasting and Social Change*, *120*, 14–23. doi:10.1016/j.techfore.2017.03.032

Furtado, J., Pereira, A., Pereira, I., & Moreira, A. C. (2019). Does theory really fit real life situations?: A case study on the internationalization process of a technological service-based firm. In N. Teixeira, T. Costa, & I. Lisboa (Eds.), Handbook of research on entrepreneurship, innovation, and internationalization (pp. 419–438). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-8479-7.ch016

Furusten, S., & Kinch, N. (1993). *Hur formas den skandinaviska ledarstilen?* Uppsala: Univ., Företagsekonomiska inst.

Gabrielsson, M., & Gabrielsson, P. (2008). Global marketing strategies of born globals and globalising internationals in the ICT field. *Journal of Euromarketing*, *12*(3/4), 123–145.

Gagliardi, P. (1986). The creation and change of organizational cultures: A conceptual framework. *Organization Studies*, *7*(2), 117–134. doi:10.1177/017084068600700203

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362. doi:10.1002/job.322

Galbraith, J. R., & Kazanjian, R. K. (1986). *Strategy implementation: structure, systems, and process*. West publishing.

Gallié, E.-P., & Roux, P. (2010). Forms and determinants of R&D collaborations: Evidence based on French data. *Industry and Innovation*, *17*(6), 551–576. doi:10.1080/13662716.2010.530838

Gamage, S. K. N., & Kuruppuge, R. H. (2017). Energy consumption, tourism development, and environmental degradation in Sri Lanka. *Energy Sources. Part B, Economics, Planning, and Policy*, *12*(10), 910–916. doi:10.1080/15567249.2017.1324533

Ganco, M., & Agarwal, R. (2009). Performance Differentials between Diversifying Entrants and entrepreneurial Start-ups: A Complexity Approach. *Academy of Management Review*, *34*(2), 228–252. doi:10.5465/amr.2009.36982618

Gao, J., Xu, W., & Zhang, L. (2019). Tourism, economic growth, and tourism-induced EKC hypothesis: evidence from the Mediterranean region. *Empirical Economics*, 1-23.

Gao, J., & Zhang, L. (2019). Exploring the dynamic linkages between tourism growth and environmental pollution: New evidence from the Mediterranean countries. *Current Issues in Tourism*, *24*(1), 1–17. doi:10.1080/13683500.2019.1688767

García Calvo, A. (2020). State-firm Coordination and Upgrading in Spain's and Korea's ICT Industries. *New Political Economy*. Advance online publication. doi:10.1080/13563467.2019.1708882

Garcia, M. U., Cortes, C., Marco-Lajara, B., & Zaragoza-Saez, P. (2014). Strategy, training and performance fit. *International Journal of Hospitality Management*, *42*(1), 100–116. doi:10.1016/j.ijhm.2014.06.001

García-Sánchez, A., Molero, J., & Rama, R. (2016). Are "the best" foreign subsidiaries cooperating for innovation with local partners? The case of an intermediate country. *Science & Public Policy*, *43*(4), 532–545. doi:10.1093cipolcv057

García-Sánchez, A., & Rama, R. (2020). Foreign ownership and domestic cooperation for innovation during good and harsh economic times. *Int.J. of Multinational Corporation Strategy*. 3(1), 4-25.

Garud, R., Jain, S., & Kumaraswamy, A. (2002). Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java. *Academy of Management Journal*, *45*, 196–214.

Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R & D Management*, *40*(3), 213–221. doi:10.1111/j.1467-9310.2010.00605.x

Gavrilović, Z., & Maksimović, M. (2018). Green innovations in the tourism sector. *Strategic Management*, *23*(1), 36–42. doi:10.5937/StraMan1801036G

Gearhart, J. L., Adair, K. L., Detry, R. J., Durfee, J. D., Katherine, J. A., & Martin, N. (2013). Comparison of open-source linear programming solvers. In *SANDIA REPORT*. Retrieved from https://prod-ng.sandia.gov/techlib-noauth/access-control.cgi/2013/138847.pdf

Geldres-Weiss, V., Uribe-Borquez, C., Coudounaris, D., & Monreal-Perez, J. (2016). Innovation and experiential knowledge in firm exports: Applying the initial U-model. *Journal of Business Research*, *69*(11), 5076–5081. doi:10.1016/j.jbusres.2016.04.083

Gentry, R. J., & Elms, H. (2009). Firm partial modularity and performance in the electronic manufacturing services industry. *Industry and Innovation*, *16*(6), 575–592. doi:10.1080/13662710903371074

George, G., Wiklund, J., & Zahra, A. (2005). Ownership and the internationalization of small firms. *Journal of Management*, *31*(2), 210–233. doi:10.1177/0149206304271760

Getz, K. A. (1997). Research in corporate political action: Integration and assessment. *Business & Society*, *36*(1), 32–72. doi:10.1177/000765039703600103

Ghauri, P. (2004). Designing and conducting case studies in international business research. In R. Marschan-Piekkari & C. Welch (Eds.), Handbook of Qualitative Research Methods for International Business (pp. 109–124). Massachusetts: Edward Elgar. doi:10.4337/9781781954331.00019

Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic Management Journal*, *29*(13), 1465–1474. doi:10.1002mj.722

Gibson, I., Rosen, D., & Stucker, B. (2014). Additive Manufacturing Technologies: 3D printing, rapid prototyping and direct digital manufacturing. New York City: Springer.

Gillanders, R. (2014). Corruption and Infrastructure at the Country and Regional Level. *The Journal of Development Studies*, *50*(6), 803–819. doi:10.1080/00220388.2013.858126

Global Entrepreneurship Index (GEI). (2017). *The Global entrepreneurship and development index*. https://thegedi.org/global-entrepreneurship-and-development-index/

Glushkova, S., Lomakina, O., & Sakulyeva, T. (2019). The economy of developing countries in the context of globalization: Global supply chain management. *International Journal of Supply Chain Management*, *8*(1), 876–884.

Glynn, P., Kobrin, S. J., & Naim, M. (1997). The globalization of corruption. *Corruption and the Global Economy, 7*, 17-27.

Goel, R. K., & Saunoris, J. W. (2017). The nexus of white-collar crimes: Shadow economy, corruption, and uninsured motorists. *Applied Economics*, *49*(31), 3032–3044. doi:10.1080/00036846.2016.1251570

Goksoy, A., Ozsoy, B., & Vayvay, O. (2012). Business process re-engineering: Strategic tool for managing organizational change an application in a multinational company. *International Journal of Business and Management*, *7*(2), 89–112. doi:10.5539/ijbm.v7n2p89

Golden, M. A. (2002). Does Globalization Reduce Corruption? Some Political Consequences of Economic Integration. Department of Political Science, University of California. 10.1.1.483.8492

Goli, A., Tirkolaee, E. B., Malmir, B., Bian, G., & Sangaiah, A. K. (2019). A multi-objective invasive weed optimization algorithm for robust aggregate production planning under uncertain seasonal demand. *Computing*, *101*(6), 499–529. doi:10.100700607-018-00692-2

Goll, I., & Rasheed, A. A. (2005). The relationships between top management demographic characteristics, rational decision making, environmental munificence, and firm performance. *Organization Studies*, *27*(6), 999–1024. doi:10.1177/0170840605053538

Gomes da Silva, C., Figueira, J., Lisboa, J., & Barman, S. (2006). An interactive decision support system for an aggregate production planning model based on multiple criteria mixed integer linear programming. *Omega*, *34*(2), 167–177. doi:10.1016/j.omega.2004.08.007

Gordon, G. G. (1991). Industry Determinants of Organizational Culture. *Academy of Management Review*, *16*(2), 396–415. doi:10.5465/amr.1991.4278959

Gossling, S., & Peeters, P. (2015). Assessing tourism's global environmental impact 1900-2050. *Journal of Sustainable Tourism*, *23*(5), 639–659. doi:10.1080/09669582.2015.1008500

Gras, D. & Krause, R. (2019) When does it pay to stand out as stand-up? Competitive contingencies in the corporate social performance–corporate financial performance relationship. *Strategic Organization*, *17*(1).

Gratton, L. (2014). What a corporation can be. *Business Strategy Review*, *25*(2), 10–15. doi:10.1111/j.1467-8616.2014.01046.x

Griffiths, A., & Zammuto, R. F. (2005). Institutional Governance Systems and Variations in National Competitive Advantage: An Integrative Framework. *Academy of Management Review*, *30*(4), 823–842. doi:10.5465/amr.2005.18378880

Grossman, G. M., & Krueger, A. B. (1991). *Environmental Impacts of a North American Free Trade Agreement.* National Bureau of Economic Research Working Paper Series, No. 3914. doi:10.3386/w3914

Grossman, R. S. (2014). *Wrong: nine economic policy disasters and what we can learn from them*. Oxford University Press.

Gründler, K., & Potrafke, N. (2019). Corruption and economic growth: New empirical evidence. *European Journal of Political Economy*, *60*, 101810. doi:10.1016/j.ejpoleco.2019.08.001

Grünig, R., & Morschett, D. (2017). Developing International Strategies. New York: Springer. doi:10.1007/978-3-662-53123-5

Gual, J., & Mas, N. (2011). Industry Characteristics and Anti-Competitive Behavior: Evidence from the European Commission's Decisions. *Review of Industrial Organization*, *39*(3), 207–230. doi:10.100711151-011-9290-z

Gueye, C. A., del Granado, M. J. A., Garcia-Verdu, M. R., Hussain, M. M., Jang, M. B., Weber, M. S., & Corrales, M. J. S. (2014). *Managing volatile capital flows: Experiences and lessons for sub-Saharan African frontier markets*. International Monetary Fund.

Guimón, J. (2009). Government strategies to attract R&D-intensive FDI. *Journal of Technology Transfer, 34*(4), 364-379. doi:10.100710961-008-9091-1

Guimón, J., & Salazar-Elena, J. C. (2015). Collaboration in innovation between foreign subsidiaries and local universities: Evidence from Spain. *Industry and Innovation*, *22*(6), 445–466. doi:10.1080/13662716.2015.1089034

Günther, J., Jindra, B., & Stephan, J. (2010). FDI and The National Innovation System—Evidence from Central and Eastern Europe. *World Scientific Book Chapters*, 303-332.

Gupta, A. K., & Govindarajan, V. (1984). Business Unit Strategy, Managerial Characteristics, and Business Unit Effectiveness at Strategy Implementation. *Academy of Management Journal*, *27*(1), 25–41.

Gustafsson, R., Jääskeläinen, M., Maula, M., & Uotila, J. (2015). (Forthcoming). Emergence of Industries: A Review and Future Directions. *International Journal of Management Reviews*. Advance online publication. doi:10.1111/ijmr.12057

Gustavsson, B. (1995). Human Values in Swedish Management. *Journal of Human Values*, *1*(2), 153–171. doi:10.1177/097168589500100202

Gwynne, P. (2005). International Careers Report: Singapore. *Science*, *307*(5712), 1127–1130.

Haavisto, I., Heaslip, G., & Larson, P. (2016). Supply chain strategy. In I. Haavisto, G. Kovacs, & K. Spens (Eds.), *Supply Chain Management for Humanitarians*. London: Kogan Page.

Habib, M. N., & Shah, A. (2013). Business process re-engineering: Literature review of approaches and applications. *Proceedings of 3rd Asia-Pacific Business Research Conference*, 1-25.

Hacker, J. S., & Pierson, P. (2010). *Winner-take-all politics: How Washington made the rich richer—and turned its back on the middle class*. Simon & Schuster.

Haddoud, M. Y., Onjewu, A.-K., Jones, P., & Newbery, R. (2018). Investigating the moderating role of export promotion programmes using evidence from North-Africa. *Critical Perspectives on International Business*, *14*(2-3), 282–308. doi:10.1108/cpoib-11-2016-0059

Hambrey, J. (2007). A review of relevant experience of coastal and marine National Parks Kosterhavets proposed Marine Park, Sweden. *Hambrey Consulting*, (September), 1–28. Retrieved from http://extra.lansstyrelsen.se/kosterhavet/SiteCollectionDocuments/sv/english/case-study-3.pdf

Hambrick, D. C. (1983). An empirical typology of mature industrial product environments. *Academy of Management Journal*, *26*, 213–230.

Hambrick, D. C., & Abrahamson, E. (1995). Assessing Managerial Discretion Across Industries: A Multimethod Approach. *Academy of Management Journal*, *38*(5), 1427–1441.

Hambrick, D. C., & Finkelstein, S. (1987). Managerial discretion: A bridge between polar views on organizations. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 9, pp. 369–406). JAI Press.

Hammer, M., & Champy, J. (2009). *Re-engineering the Corporation: Manifesto for Business Revolution.* Zondervan. Available at https://books.google.co.in/books?isbn=0061808644

Hammond, R. (2000). *Endogenous transition dynamics in corruption: An agent-based computer model*. Center on Social and Economic Dynamics.

Hånell, M. S., & Nordman, R. (2019). What geographical scope works best for rapidly internationalizing SMEs? *Journal of Business and Industrial Marketing*, *34*(6), 1194–1202. doi:10.1108/JBIM-11-2017-0299

Hanif, M., Khan, Y. S., & Zaheer, A. (2014). Impact of organizational resistance to change on BPR implementation: A case of state bank of Pakistan. *European Journal of Business and Management*, *6*(4), 186–196.

Hansen, G. H., & Steen, M. (2015). Offshore oil and gas firms' involvement in offshore wind: Technological frames and undercurrents. *Environmental Innovation and Societal Transitions*, *17*, 1–14. doi:10.1016/j.eist.2015.05.001

Hansen, M. W., & Hoenen, A. (2016). Global oligopolistic competition and foreign direct investment: Revisiting and extending the literature. *Critical Perspectives on International Business*, *12*(4), 369–387. doi:10.1108/cpoib-03-2014-0017

Hanssmann, F., & Hess, S. W. (1960). A Linear Programming Approach to Production and Employment Scheduling. *Management Science, MT*, *1*(1), 46–51. doi:10.1287/mantech.1.1.46

Harford, T. (2017). Messy: the power of disorder to transform our lives. (Reprint Ed). New York: Riverhead Books.

Harms, R., & Schiele, H. (2012). Antecedents and consequences of effectuation and causation in the international new venture creation process. *Journal of International Entrepreneurship*, *10*(2), 95–116. doi:10.100710843-012-0089-2

Harris, R., & Davison, R. (2002). Anxiety and involvement: Cultural dimensions of attitudes toward computers in developing societies. In *Global perspective of information technology management* (pp. 234–259). IGI Global. doi:10.4018/978-1-931777-11-7.ch017

Hasker, K., & Sickles, R. (2010). EBay in the economic literature: Analysis of an auction marketplace. *Review of Industrial Organization*, *37*(1), 3–42. doi:10.100711151-010-9257-5

Hathroubi, S., Peypoch, N., & Robinot, E. (2014). Technical efficiency and environmental management: The Tunisian case. *Journal of Hospitality and Tourism Management*, *21*(1), 27–33. doi:10.1016/j.jhtm.2014.03.002

Heenan, A., Pomeroy, R., Bell, J., Munday, P. L., Cheung, W., Logan, C., Brainard, R., Yang Amri, A., Aliño, P., Armada, N., David, L., Rivera-Guieb, R., Green, S., Jompa, J., Leonardo, T., Mamauag, S., Parker, B., Shackeroff, J., & Yasin, Z. (2015). A climate-informed, ecosystem approach to fisheries management. *Marine Policy*, *57*, 182–192. doi:10.1016/j.marpol.2015.03.018

Heizer, J., Render, B., & Munson, C. (2017). Operations Management: Sustainability and Supply Chain Management (12th ed.). New York City: Pearson.

Helfat, C. E., & Eisenhardt, K. M. (2004). Inter-temporal economies of scope, organizational modularity, and the dynamics of diversification. *Strategic Management Journal*, *25*(13), 1217–1232. doi:10.1002mj.427

Helms, M. M., Rodríguez, M. A., Ríos, L., & Hargrave, W. B. (2011). Entrepreneurial potential in Argentina: A swot analysis. *Competitiveness Review*, *21*(3), 269–287. doi:10.1108/10595421111134859

Henama, U. S. (2018). Disruptive entrepreneurship using Airbnb: The South African experience. *African Journal of Hospitality, Tourism and Leisure*, *7*(1), 1–16.

Hetzel, R. (2014). *The great recession: market failure or policy failure?* Cambridge University Press.

Hillman, A. J., Keim, G. D., & Schuler, D. (2004). Corporate political activity: A review and research agenda. *Journal of Management*, *30*(6), 837–857. doi:10.1016/j.jm.2004.06.003

Hillman, A. L. (2004). Corruption and public finance: An IMF perspective. *European Journal of Political Economy*, *20*(4), 1067–1077. doi:10.1016/j.ejpoleco.2003.09.004

Hillman, A., & Hitt, M. (1999). Corporate political strategy formulation: A model of approach, participation and strategy decisions. *Academy of Management Review*, *24*(4), 825–842. doi:10.5465/amr.1999.2553256

Hillman, A., & Keim, C. (1995). International variation in the business-government interface: Institutional and organizational considerations. *Academy of Management Review*, *20*(1), 193–214. doi:10.5465/amr.1995.9503272003

Hilmersson, M. (2014). Small and medium-sized enterprise internationalisation strategy and performance in times of market turbulence. *International Small Business Journal*, *32*(4), 386–400. doi:10.1177/0266242613497744

Hindriks, J., Keen, M., & Muthoo, A. (1999). Corruption, extortion and evasion. *Journal of Public Economics*, *74*(3), 395–430. doi:10.1016/S0047-2727(99)00030-4

Hisrich, R. (2007). Entrepreneurship research and practice. *A Call to Action for Psychology, 62*(6), 575-589.

Hoefnagel, S. J., & Bode, A. U. (2001). Achievements and Limitations of International Environmental Regimes and Institutions in Positive Dispute Prevention: UNEP's Role. In *Responding to Environmental Conflicts: Implications for Theory and Practice* (pp. 283–308). Springer. doi:10.1007/978-94-010-0395-7_18

Hofstede, G. (1983). National cultures in four dimensions: A research-based theory of cultural differences among nations. *International Studies of Management & Organization*, *13*(1-2), 46–74. doi:10.1080/00208825.1983.11656358

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations*. Sage publications.

Holcombe, R. G., & Boudreaux, C. J. (2015). Regulation and corruption. *Public Choice*, *164*(1), 75–85. doi:10.100711127-015-0263-x

Holl, A., & Rama, R. (2009). The spatial patterns of networks, hierarchies and subsidiaries. *European Planning Studies, 17*(9), 1261-1281.

Holl, A., & Rama, R. (2014). Foreign subsidiaries and technology sourcing in Spain. *Industry and Innovation*, *21*(1), 43–64. doi:10.1080/13662716.2014.879254

Holl, A., & Rama, R. (2016). Persistence of innovative activities in times of crisis: The case of the Basque Country. *European Planning Studies*, *24*(10), 1863–1883. doi:10.1080/09654313.2016.1204426

Holl, A., & Rama, R. (2019). Local cooperation for innovation in ICT—Domestic groups with collaborations for innovation abroad and foreign subsidiaries. *Science & Public Policy*, *46*(4), 599–610. doi:10.1093cipolcz013

Holt, C. C. (2002). Learning how to plan production, inventories, and work force. *Operations Research*, *50*(1), 96–99. doi:10.1287/opre.50.1.96.17779

Holt, C. C., Modigliani, F., & Simon, H. A. (1955). A Linear Decision Rule for Production and Employment Scheduling. *Management Science*, *2*(1), 1–30. doi:10.1287/mnsc.2.1.1

Holtz-Eakin, D., & Selden, T. M. (1995). Stoking the fires? CO2 emissions and economic growth. *Journal of Public Economics*, *57*(1), 85–101. doi:10.1016/0047-2727(94)01449-X

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & Gupta, V. (Eds.). (2004). *Culture, leadership, and organizations: The GLOBE study of 62 societies*. Sage publications.

House, R., Javidan, M., Hanges, P., & Dorfman, P. (2002). Understanding cultures and implicit leadership theories across the globe: An introduction to project GLOBE. *Journal of World Business*, *37*(1), 3–10. doi:10.1016/S1090-9516(01)00069-4

Hrebiniak, L. G., & Snow, C. C. (1980). Industry Differences in Environmental uncertainty and organizational characteristics related to uncertainty. *Academy of Management Journal*, *23*(4), 750–759.

Huang, C. J. (2016). Is corruption bad for economic growth? Evidence from Asia-Pacific countries. *The North American Journal of Economics and Finance*, *35*(1), 247–256. doi:10.1016/j.najef.2015.10.013

Huang, S. L. (2014). The impact of context on display ad effectiveness: Automatic attitude activation and applicability. *Electronic Commerce Research and Applications*, *13*(5), 341–354. doi:10.1016/j.elerap.2014.06.006

Huang, S., & Holden, D. (2016). The R&D Boundaries of the Firm: A Problem-Solving Perspective. *International Journal of the Economics of Business*, *23*(3), 287–317. doi:10.1080/13571516.2016.1156247

Hugo Elliot, V. (2016). Institutional entrepreneurship and change; A contemporary history of the Swedish banking industry and its performance management systems. *Journal of Accounting and Organizational Change*, *12*(2), 223–251. doi:10.1108/JAOC-06-2013-0059

Hull, C. E., Hung, Y. C., Hair, N., Perottı, V., & De Martino, R. (2007). Taking advantage of digital opportunities: A typology of digital entrepreneurship. *International Journal of Networking and Virtual Organisations*, *4*(3), 290–303. doi:10.1504/IJNVO.2007.015166

Hultberg, J. (2018). *Fisket i Koster-Väderöfjorden Interpellation 2018/19:100 Johan Hultberg (M) - Riksdagen*. Retrieved July 14, 2020, from Sveriges Riksdag website: https://www.riksdagen.se/sv/dokument-lagar/dokument/_H610100

Humphreys, J., & Clark, R. (2020). *Marine Protected Areas: Science, Policy and Management*. Retrieved from https://books.google.no/ books?id = SOW2 DwAA QBAJ &pg = PA30 8&lpg = PA30 8&dq = Coop + Änglamark + Prize + 2009 & source = bl&ots = zSLR Yj96 Zo&sig = ACfU3U0 _ 2-BF aEPm Tc _ z8yb PGDD LWMU W5g & hl = no & sa = X & ved = 2ahU KEwj QzPr 9n6f rAhX ul4s KHe- dBtg Q6AE wDno ECAE QAQ #v = onepage &q = Coop Änglamark Prize 2009 &f = false

Husted, B. W. (2002). Culture and international anti-corruption agreements in Latin America. *Journal of Business Ethics*, *37*(4), 413–422. doi:10.1023/A:1015248921716

Iammarino, S., Padilla-Pérez, R., & von Tunzelmann, N. (2008). Technological Capabilities and Global–Local Interactions: The Electronics Industry in Two Mexican Regions. *World Development*, *36*(10), 1980–2003. doi:10.1016/j.worlddev.2007.10.022

Ietto-Gillies, G. (2012). *Transnational corporations: Fragmentation amidst integration*. Routeldge.

Ingwersen, W. W., Garmestani, A. S., Gonzalez, M. A., & Templeton, J. J. (2014). A systems perspective on responses to climate change. *Clean Technologies and Environmental Policy*, *16*(4), 719–730. doi:10.100710098-012-0577-z

ISIC. (2008). International Standard Industrial Classification of all Economic Activities (ISIC). United Nations, Department of Economic and Social Affairs, Statistics Division. New York: United Nations.

Jacobides, M. G., & Winter, S. G. (2005). The co-evolution of capabilities and transaction costs: Explaining the institutional structure of production. *Strategic Management Journal*, *26*(5), 395–413. doi:10.1002mj.460

Jacobs, F. R., Berry, W. L., Whybark, D. C., & Vollmann, T. E. (2011). *Manufacturing planning and control for supply chain management*. London: McGraw Hill.

Jacobs, F. R., & Chase, R. B. (2018). *Operations and supply chain management* (15th ed.). London: McGraw Hill.

Jain, A. K., & Singal, A. K. (2014). Mapping vulnerability: How emerging markets respond to multinationals. *The Journal of Business Strategy*, *35*(6), 41–48. doi:10.1108/JBS-11-2013-0112

Jaklič, A., Damijan, J. P., Rojec, M., & Kunčič, A. (2014). Relevance of innovation cooperation for firms' innovation activity: The case of Slovenia. *Economic Research-Ekonomska Istraživanja*, *27*(1), 645–661. doi:10.1080/1331677X.2014.975513

Jamalnia, A., Yang, J. B., Feili, A., Xu, D. L., & Jamali, G. (2019). Aggregate production planning under uncertainty: A comprehensive literature survey and future research directions. *International Journal of Advanced Manufacturing Technology*, *102*(1–4), 159–181. doi:10.100700170-018-3151-y

Jang, J., Kim, S., Lee, Y., & Kim, J. (2013). The effects of relationship benefit on relationship quality and store loyalty from convergence environments—NPS analysis and moderating effects. *Electronic Commerce Research*, *13*(3), 291–315. doi:10.100710660-013-9117-0

Jani, D., & Han, H. (2013). Personality, social comparison, consumption emotions, satisfaction, and behavioral intentions: How do these and other factors relate in a hotel setting? *International Journal of Contemporary Hospitality Management*, *25*(7), 970–993. doi:10.1108/IJCHM-10-2012-0183

Jelassi, T., Enders, A., & Martinez-Lopez, F. J. (2014). *Strategies for e-business: creating value through electronic and mobile commerce concepts and cases*. Prentice Hall.

Jenkins, M. (2014). Innovate or imitate? the role of collective beliefs in competences in competing firms. *Long Range Planning*, *47*(4), 173–185. doi:10.1016/j.lrp.2013.04.001

Jentoft, S. (1989). Fisheries co-management: Delegating government responsibility to fishermen's organizations. *Marine Policy*, *13*(2), 137–154. doi:10.1016/0308-597X(89)90004-3

Johanson, J., & Mattsson, L. G. (2015). Internationalisation in Industrial Systems — A Network Approach. In M. Forsgren, U. Holm, & J., Johanson (Eds.), Knowledge, networks and power (pp. 111–132). London: Palgrave Macmillan.

Johanson, J., & Vahlne, J. (2009). The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership. *Journal of International Business Studies*, *40*(9), 1411–1431. doi:10.1057/jibs.2009.24

Johanson, J., & Vahlne, J.-E. (1977). The internationalization process of the firm – a model of knowledge development and increasing foreign market commitments. *Journal of International Business Studies*, *8*(1), 23–32. doi:10.1057/palgrave.jibs.8490676

Johanson, J., & Wiedersheim-Paul, F. (1975). The internationalization of the firm: Four Swedish cases. *Journal of Management Studies*, *12*(3), 305–322. doi:10.1111/j.1467-6486.1975.tb00514.x

Jonell, M., Crona, B., Brown, K., Rönnbäck, P., & Troell, M. (2016). Eco-labeled seafood: Determinants for (blue) green consumption. *Sustainability (Switzerland)*, *8*(9), 884. Advance online publication. doi:10.3390u8090884

Jones, C., & Munday, M. (2007). Exploring the Environmental Consequences of Tourism: A Satellite Account Approach. *Journal of Travel Research*, *46*(2), 164–172. doi:10.1177/0047287507299592

Jones, M. V., Coviello, N., & Tang, Y. K. (2011). International entrepreneurship research (1989–2009): A domain ontology and thematic analysis. *Journal of Business Venturing*, *26*(6), 632–659. doi:10.1016/j.jbusvent.2011.04.001

Jönsson, S. A. (1995). *Goda utsikter: svenskt management i perspektiv*. Stockholm: Nerenius & Santerus i samarbete med Gothenburg Research Institute (GRI).

Jönsson, S., & Strannegård, L. (2009). *Ledarskapsboken*. Stockholm: Liber AB.

Kamalian, A. R., Yaghoubi, N., & Moloudi, J. (2016). Providing functional model for developing digital entrepreneurship. *International Journal of Business and Development Studies*, *8*(1), 97–116.

Kandiller, L. (2007). *Principles of Mathematics in Operations Research*. Springer.

Karakaya, E., & Sofuoğlu, E. (2015). *İklim Değişikliği Müzakerelerine Bir Bakış: 2015 Paris İklim Zirvesi*. Paper presented at the International Symposium on Eurasia Energy Issues, İzmir, Turkey.

Katila, R., & Shane, S. (2005). When does Lack of Resources Make New Firms Innovative. *Academy of Management Journal*, *48*(5), 814–829. doi:10.5465/amj.2005.18803924

Katircioglu, S. T. (2014). Testing the tourism-induced EKC hypothesis: The case of Singapore. *Economic Modelling*, *41*(1), 383–391. doi:10.1016/j.econmod.2014.05.028

Katz, D., & Kahn, R. L. (1966). *The social psychology of organizations*. Wiley.

Katz, M. L. (2019). Platform ecomomics and antitrust enforcement: A little knowlwdw is a dangerous thing. *Journal of Economics & Management Strategy*, *28*(1), 138–152. doi:10.1111/jems.12304

Kazgan, G. (2000). *Economic Thought* (9th ed.). Remzi. (in Turkish)

Kelley, T., & Littman, J. (2006). *The Ten Faces of Innovation: Strategies for heightening creativity*. London: Profile Books.

Kellon, L. (2019). Virgin Media pledges gigabit broadband to millions of homes. *BBC News*. https://www.bbc.com/news/technology-49096856

Kelly, K. (2016). *The Inevitable*. Penguin.

Kemmis, S. (2016). The Action Research Planner: Doing critical participatory action research. New York City: Springer.

Khajavi, S., Holstrom, J., & Partanen, J. (2018). Additive manufacturing in the spare parts supply chain: Hub configuration and technology maturity, *Rapid Prototyping Journal*. doi:10.1108/RPJ-03-2017-0052

Khamseh, H. M., & Nasiriyar, M. (2014). Avoiding alliance myopia: Forging learning outcomes for long-term success. *The Journal of Business Strategy*, *35*(4), 37–44. doi:10.1108/JBS-10-2013-0099

Khan, A., Bibi, S., Ardito, L., Lyu, J., Hayat, H., & Arif, A. M. (2020). Revisiting the dynamics of tourism, economic growth, and Environmental Pollutants in the Emerging economies—Sustainable tourism Policy implications. *Sustainability*, *12*(6), 2533. doi:10.3390u12062533

Kharusi, S. A., & Ada, M. S. (2018). External debt and economic growth: The case of emerging economy. *Journal of Economic Integration*, *33*(1), 1141–1157. doi:10.11130/jei.2018.33.1.1141

Khattak, D., & Wang, Z. (2018). Dynamic relationship between tourism, economic growth, and environmental quality. *Journal of Sustainable Tourism*, *26*(11), 1928–1943. doi:10.1080/09669582.2018.1526293

Kinal, T. S. (2013). A recipe for change: Management unleashed. *Business Strategy Review*, *24*(4), 68–71. doi:10.1111/j.1467-8616.2013.01005.x

Kitamura, Y., Ichisugi, Y., Karkour, S., & Itsubo, N. (2020). Carbon footprint evaluation based on tourist consumption toward sustainable tourism in Japan. *Sustainability*, *12*(6), 2219. doi:10.3390u12062219

Klein, G. (2017). Seeing What Others Don't: The remarkable ways we gain insights. Boston, MA: Nicholas Brealey Publishing.

Kleinbaum, A. M. (2012). Organizational Misfits and the Origins of Brokerage in Intrafirm Networks. *Administrative Science Quarterly*, *57*(3), 407–452. doi:10.1177/0001839212461141

Kleı̇n, M. (2020). Digital transformation scenarios of businesses - a conceptual model proposal. *Electronic Journal of Social Sciences*, *19*(74), 997–1019. doi:10.17755/esosder.676984

Klepper, S., & Graddy, E. (1990). The evolution of new industries and the determinants of market structure. *The RAND Journal of Economics*, 27–44.

Knight, G. (2000). Entrepreneurship and marketing strategy: The SME under globalization. *Journal of International Marketing*, *8*(2), 12–32. doi:10.1509/jimk.8.2.12.19620

Knight, G. (2001). Entrepreneurship and strategy in the international SME. *Journal of International Management*, *7*(3), 155–171. doi:10.1016/S1075-4253(01)00042-4

Knight, G., & Cavusgil, S. (2004). Innovation, organizational capabilities, and the born-global firm. *Journal of International Business Studies*, *35*, 24–41.

Knight, G., Madsen, T. K., & Servais, P. (2004). An inquiry into born-global firms in Europe and the USA. *International Marketing Review*, *21*(6), 645–665. doi:10.1108/02651330410568060

Knutsen, C. H., Kotsadam, A., Olsen, E. H., & Wig, T. (2017). Mining and local corruption in Africa. *American Journal of Political Science*, *61*(2), 320–334. doi:10.1111/ajps.12268

Koçak, E., Ulucak, R., & Ulucak, Z. Ş. (2020). The impact of tourism developments on CO2 emissions: An advanced panel data estimation. *Tourism Management Perspectives*, *33*, 100611. doi:10.1016/j.tmp.2019.100611

Koçak, O. (2009). Bilgi teknolojilerini kullanan yeni girişimcilik modelinin iş yaratma etkisi. *Sosyal Siyaset Konferansları Dergisi*, *0*(57), 382–405.

Koch, J. V. (1974). *Industrial Organization and Prices*. Prentice Hall.

Koenigstein, S., Ruth, M., & Gößling-Reisemann, S. (2016). Stakeholder-informed ecosystem modeling of ocean warming and acidification impacts in the barents sea region. *Frontiers in Marine Science*, *3*(JUN), 1–13. doi:10.3389/fmars.2016.00093

Koh, H. C. (1996). Testing hypotheses of entrepreneurial characteristics: A study of Hong Kong MBA Students. *Journal of Managerial Psychology*, *11*(3), 12–25. doi:10.1108/02683949610113566

Konak, A. (2019). Küresel ölçekte gerçekleştirilen girişimcilik faaliyetleri sürecinde karşılaşılan sorunların tespiti ve değerlendirilmesi: Türkiye örneği. *Üçüncü Sektör Sosyal Ekonomi Dergisi*, *54*(1), 446-462.

Kontinen, T., & Ojala, A. (2010). The internationalization of family businesses: A review of extant research. *Journal of Family Business Strategy*, *1*(2), 97–107. doi:10.1016/j.jfbs.2010.04.001

Koop, G. M. (2003). *Bayesian econometrics*. John Wiley & Sons Inc.

Korkpoe, C. H., & Howard, N. (2019). Volatility Model Choice for Sub-Saharan Frontier Equity Markets-A Markov Regime Switching Bayesian Approach. *EMAJ: Emerging Markets Journal*, *9*(1), 69–79. doi:10.5195/emaj.2019.172

Korsakiene, R., & Tvaronavičiene, M. (2012). The internationalization of SMEs: An integrative approach. *Journal of Business Economics and Management*, *13*(2), 294–307. doi:10.3846/16111699.2011.620138

Kotabe, M., Mol, M. J., & Ketkar, S. (2008). An evolutionary stage model of outsourcing and competence destruction: A Triad comparison of the consumer electronics industry. *Management Innovation Review*, *48*(1), 65–93. doi:10.100711575-008-0004-1

Kotarba, M. (2018). Digital transformation of business models. *Foundations of Management*, *10*(1), 123–142. doi:10.2478/fman-2018-0011

Kotler, P., & Keller, K. (2006). Marketing Management. Upper Saddle River, NJ: Prentice Hall.

Kovacic, Z. J. (2005). A Brave New E-World? An Exploratory Analysis of Worldwide E-Government Readiness, Level of Democracy, Corruption, and Globalization. *International Journal of Electronic Government Research*, *1*(3), 15–32. doi:10.4018/jegr.2005070102

Koyuncu, J., & Ünver, M. (2017). The Association between Corruption and Globalization in African Countries. *Sosyal Bilimler Araştırma Dergisi*, *6*(4), 20–28.

Kraay, A., Zoido-Lobaton, P., & Kaufmann, D. (2002). *Governance matters II: Updated indicators for 2000–01*. The World Bank. doi:10.1596/1813-9450-2772

Krajewski, L., Malhotra, M., & Ritzman, L. (2016). Operations Management: Processes and Supply Chains (11th ed.). New York City: Pearson.

Kraus, S., Brem, A., Schuessler, M., Schussler, F., & Niemand, T. (2017). Innovative born globals: Investigating the influence of their business models on international performance. *International Journal of Innovation Management*, *21*(1), 1–54. doi:10.1142/S1363919617500050

Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., & Spitzer, J. (2018). Digital entrepreneurship: A research agenda on new business models for The Twenty- First Century. *International Journal of Entrepreneurial Behaviour & Research*, *25*(2), 353–375. doi:10.1108/IJEBR-06-2018-0425

KRAV. (2019). *Standards for Production 2019-20 Edition*. Retrieved January 24, 2021 from https://wwwkravse.cdn.triggerfish.cloud/uploads/sites/2/2020/06/krav-standards2019-20v2bookmarks.pdf

Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı (KOSGEB). (2019). *Turkey Entrepreneurial Strategy and Action Plan 2015-2018*. https://www.kosgeb.gov.tr/Content/Upload/Dosya/Mali%20Tablolar/Gisep_2015-2018_EN.pdf

Kuhn, T. S. (1962). The structure of scientiðc revolutions. Academic Press.

Kuivalainen, O., Lindqvist, J., Saarenketo, S., & Äijö, T. (2006). International growth of Finnish software firms: Starting points, pathways and outcomes. *Journal of Euromarketing*, *16*(1/2), 7–22.

Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship Theory and Practice*, *29*(5), 577–597. doi:10.1111/j.1540-6520.2005.00099.x

Kuznets, S. (1955). Economic Growth and Income Inequality. *The American Economic Review*, *45*(1), 1–28.

Kuzucu, S. (2018). Do foreign direct investment and portfolio investment stimulate economic growth? Evidence from developing countries. *Journal of Economics Finance and Accounting*, *5*(4), 331–338. doi:10.17261/Pressacademia.2018.1000

Kvale, S. (1996). The 1,000-Page Question. *Qualitative Inquiry*, *2*(3), 275–284. doi:10.1177/107780049600200302

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1999). The quality of government. *Journal of Law Economics and Organization*, *15*(1), 222–279. doi:10.1093/jleo/15.1.222

LaCanne, C. E., & Lundgren, J. G. (2018). Regenerative agriculture: Merging farming and natural resource conservation profitably. *PeerJ*, *6*, e4428. doi:10.7717/peerj.4428 PMID:29503771

Lalountas, D. A., Manolas, G. A., & Vavouras, I. S. (2011). Corruption, globalization and development : How are these three phenomena related? *Journal of Policy Modeling*, *33*(4), 636–648. doi:10.1016/j.jpolmod.2011.02.001

Lambsdorff, J. G. (2003). How corruption affects productivity. *Kyklos*, *56*(4), 457–474. doi:10.1046/j.0023-5962.2003.00233.x

Lantz, B., & Hjort, K. (2013). Real e-customer behavioural responses to free delivery and free returns. *Electronic Commerce Research*, *13*(2), 183–198. doi:10.100710660-013-9125-0

Larsson, B. (2014). Emotional professionalism in a bureaucratic context: Emotion management in case handling at the Swedish Enforcement Authority. *International Journal of Work Organisation and Emotion*, *6*(3), 281–294. doi:10.1504/IJWOE.2014.065760

Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology*, *56*, 485–516. doi:10.1146/annurev.psych.55.090902.142105

Lawett, E. (2009). *The Koster-Väderö Fiord*. Retrieved January 24, 2021 from https://www.fishsec.org/app/uploads/2016/01/OCEAN2012-Environmental-and-social-criteria-for-allocating-access-to-fisheries-resources.pdf

Lawrence, P. R., & Lorsch, J. W. (1967a). Differentiation and integration in complex organizations. *Administrative Science Quarterly*, *12*(1), 1–47. doi:10.2307/2391211

Leal, P. H., & Marques, A. C. (2021). The environmental impacts of globalization and corruption: Evidence from a set of African countries. *Environmental Science & Policy*, *115*, 116–124. doi:10.1016/j.envsci.2020.10.013

Lederman, D., Loayza, N., & Soares, R. R. (2001). Accountability and Corruption: Political Institutions Matter. *Economics and Politics*, *17*(1), 1–35. doi:10.1111/j.1468-0343.2005.00145.x

Lee, J. W., & Brahmasrene, T. (2013). Investigating the influence of tourism on economic growth and carbon emissions: Evidence from panel analysis of the European Union. *Tourism Management*, *38*(1), 69–76. doi:10.1016/j.tourman.2013.02.016

Legge, K. (2012). *Doing it Differently*. Paddington: Place Partners.

Leitaoa, N. C., & Shahbaz, M. (2016). Economic Growth, Tourism Arrivals and Climate Change. [BEE]. *Bulletin of Energy Economics*, *4*(1), 35–43.

Lenz-Cesar, F., & Heshmati, A. (2012). An econometric approach to identify determinants of cooperation for innovation among firms. *Applied Economics Letters*, *19*(3), 227–235. doi:10.1080/13504851.2011.572836

Lenzen, M., Sun, Y. Y., Faturay, F., Ting, Y. P., Geschke, A., & Malik, A. (2018). The carbon footprint of global tourism. *Nature Climate Change*, *8*(6), 522–528. doi:10.103841558-018-0141-x

Lenz, R. T. (1981). "Determinants" of organizational performance: An interdisciplinary review. *Strategic Management Journal*, *2*(2), 131–154. doi:10.1002mj.4250020204

Lieben, L. (2016, April 1). Regenerative medicine: The future of 3D printing of human tissues is taking shape. *Nature Reviews. Rheumatology*, *12*(4), 191. doi:10.1038/nrrheum.2016.29 PMID:26935277

Lieberman, M. B., Lee, G. K., & Folta, T. B. (2017). Entry, exit, and the potential for resource redeployment. *Strategic Management Journal*, *38*(3), 526–544.

Li, L., Qian, G., & Qian, Z. (2012). Early internationalization and performance of small high-tech “born-globals”. *International Marketing Review*, *29*(5), 536–561. doi:10.1108/02651331211260377

Lindell, M., & Arvonen, J. (1996). The Nordic Management Style in a European Context. *International Studies of Management & Organization*, *26*(3), 73–91. doi:10.1080/00208825.1996.11656689

Lind, J. T., & Mehlum, H. (2010). With or Without U? The Appropriate Test for a U-Shaped Relationship*. *Oxford Bulletin of Economics and Statistics*, *72*(1), 109–118. doi:10.1111/j.1468-0084.2009.00569.x

Linke, K. (2011). Generatıon Facebook? – The hıstory of socıal networks, *Global Business Management Research Conference*, Fulda, Germany.

Lipson, H., & Kurman, M. (2013). *Fabricated: The new world of 3D printing, the promise and peril of a machine that can make (almost) anything*. Hoboken, NJ: John Wiley and Sons.

Liu, Y. P., Kumail, T., Ali, W., & Sadiq, F. (2019). The dynamic relationship between CO2 emission, international tourism and energy consumption in Pakistan: A cointegration approach. *Tourism Review*, *74*(4), 761–779. doi:10.1108/TR-01-2019-0006

López-Bayon, S., & González-Diaz, M. (2010). Indefinite contract duration: Evidence from electronics subcontracting. *International Review of Law and Economics*, *30*(2), 145–159. doi:10.1016/j.irle.2010.03.001

Lopez, L., Kundu, S., & Ciravegna, L. (2009). Born global or born regional? Evidence from an exploratory study in the Costa Rican software industry. *Journal of International Business Studies*, *40*(7), 1228–1238. doi:10.1057/jibs.2008.69

Loury, G. C. (1979). Market structure and innovation. *The Quarterly Journal of Economics*, *93*(3), 395–410. doi:10.2307/1883165

Løvdal, N., & Aspelund, A. (2010). International Entrepreneurship in the Offshore Renewable Energy Industry. In R. Wüstenhagen & R. Wuebker (Eds.), Energy Entrepreneurship. Cheltenham: Edward Elgar Publishers.

Løvdal, N., & Aspelund, A. (2012). Characteristics of Born Global Industries - The Birth of Offshore Renewables. In Handbook of Research on Born Globals (pp. 285–309). Cheltenham: Edward Elgar Publishing.

Løvdal, N., & Moen, O. (2013). International Before Commercial: Investigating the Pre-Commercial Phase of International New Ventures. *Journal of Technology Management & Innovation*, *8*(2), 21–34.

Love, J. H., & Roper, S. (2004). The organisation of innovation: Collaboration, cooperation and multifunctional groups in UK and German manufacturing. *Cambridge Journal of Economics*, *28*(3), 379–395. doi:10.1093/cje/28.3.379

Loy, J., & Novak, J. I. (2019). The future of product design education Industry 4.0. In A. Raman & M. Rathakrishnan (Eds.), Redesigning Higher Education Initiatives for Industry 4.0 (pp. 164–182). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-7832-1.ch010

Lu, D., & Realff, M. J. (2013). The design of a sustainability assessment standard using life cycle information. *Journal of Industrial Ecology*, *17*(4), 493–503. doi:10.1111/j.1530-9290.2012.00539.x

Lui, F. T. (1986). A dynamic model of corruption deterrence. *Journal of Public Economics*, *31*(2), 215–236. doi:10.1016/0047-2727(86)90019-8

Luo, F., Moyle, B. D., Moyle, C. L. J., Zhong, Y. D., & Shi, S. Y. (2020). Drivers of carbon emissions in China’s tourism industry. *Journal of Sustainable Tourism*, *28*(5), 747–770. doi:10.1080/09669582.2019.1705315

Luostarinen, R., & Gabrielsson, M. (2006). Globalization and marketing strategies of Born Globals in SMOPECs. *Thunderbird International Business Review*, *48*(6), 773–801. doi:10.1002/tie.20122

Luthra, S., Kumar, S., Kharb, R., Ansari, M. F., & Shimm, S. L. (2014). Adoption of smart grid technologies: An analysis of interactions among barriers. *Renewable & Sustainable Energy Reviews*, *33*, 554–565. doi:10.1016/j.rser.2014.02.030

Machmud, S., & Sidharta, I. (2014). Business models for smes in Bandung: Swot analysis. *Journal Ekonomi*. *Bisnis and Entrepreneurship*, *8*(1), 51–61.

Maciejewski, M., & Wach, K. (2019). International startups from Poland: Born global or born regional? *Journal of Management and Business Administration*. *Central Europe*, *27*(1), 60–83.

MacKay, R. B., & Chia, R. (2013). Choice, change, and unintended consequences in strategic change: A process understanding of the rise and fall of Northco Automotive. *Academy of Management Journal*, *56*(1), 208–230. doi:10.5465/amj.2010.0734

MacKenzie, R. (2008). From networks to hierarchies: The construction of a subcontracting regime in the Irish telecommunications industry. *Organization Studies*, *29*(6), 867–886. doi:10.1177/0170840608088706

Macko, A., & Tyszka, T. (2000). Entrepreneurship and risk taking. *Applied Psychology*, *58*(3), 469–487.

Madanipour, A., & Thompson, M. F. (2020). Is globalization linked to low corruption in OECD countries? *Crime, Law, and Social Change*, *73*(1), 443–455. doi:10.100710611-019-09874-1

Majumdar, S. K., Moussawi, R., & Yaylacicegi, U. (2018). Capital Structure and Mergers: Retroperspevtive evidence from a natural experiment. *Journal of Industry, Competition and Trade*, *18*(1), 449–472. doi:10.100710842-017-0266-z

Makasi, A., & Saruchera, F. (2014). The Impact of Operational Customer Relationship Management on Customer Loyalty. *Mediterranean Journal of Social Sciences*, *5*(23), 291–291. doi:10.5901/mjss.2014.v5n23p291

Malafeyev, O. A., Nemnyugin, S. A., Rylow, D., Kolpak, E. P., & Awasthi, A. (2017, July). Corruption dynamics model. In AIP Conference Proceedings: Vol. 1863. *No. 1* (p. 170013). AIP Publishing LLC.

Malhotra, N., & Hinings, C. R. (2015). Unpacking continuity and change as a process of organizational transformation. *Long Range Planning*, *48*(1), 1–22. doi:10.1016/j.lrp.2013.08.012

Mandal, A., & Deshmukh, S. G. (1994). Vendor selection using interpretive structural modeling (ISM). *International Journal of Operations & Production Management*, *14*(6), 52–59. doi:10.1108/01443579410062086

Manolopoulos, D., Papanastassiou, M., & Pearce, R. (2005). Technology sourcing in multinational enterprises and the roles of subsidiaries: An empirical investigation. *International Business Review*, *14*(3), 249–267. doi:10.1016/j.ibusrev.2005.01.002

Marangoz, M. (2016). *Girişimcilik* [Lexical characteristics of Turkish language]. Beta Yayınevi.

Mardani, A., Streimikiene, D., Cavallaro, F., Loganathan, N., & Khoshnoudi, M. (2019). Carbon dioxide (CO2) emissions and economic growth: A systematic review of two decades of research from 1995 to 2017. *The Science of the Total Environment*, *649*, 31–49. doi:10.1016/j.scitotenv.2018.08.229 PMID:30170214

Mariotto, F., Zanni, P., & Moraes, G. (2014). What is the use of a single-case study in management research? *Revista de Administração de Empresas*, *54*(4), 358–369. doi:10.1590/S0034-759020140402

Marschke, M., & Sinclair, A. J. (2009). Learning for sustainability: Participatory resource management in Cambodian fishing villages. *Journal of Environmental Management*, *90*(1), 206–216. doi:10.1016/j.jenvman.2007.08.012 PMID:18079038

Martelli, N., Serrano, C., van den Brink, H., Pineau, J., Prognon, P., Borget, I., & El Batti, S. (2016). Advantages and disadvantages of 3-dimensional printing in surgery: A systematic review. *Surgery*, *159*(6), 1485–1500. doi:10.1016/j.surg.2015.12.017 PMID:26832986

Martin, E. F. Jr, & To, W. M. (2013). Effect of internal market orientation on organizational performance: The case of Macao's gaming industry. *International Journal of Hospitality & Tourism Administration*, *14*(3), 233–254. doi:10.1080/15256480.2013.809980

Martínez-López, J., Bagstad, K. J., Balbi, S., Magrach, A., Voigt, B., Athanasiadis, I., Pascual, M., Willcock, S., & Villa, F. (2019). Towards globally customizable ecosystem service models. *The Science of the Total Environment*, *650*, 2325–2336. doi:10.1016/j.scitotenv.2018.09.371 PMID:30292124

Maslii, N., Zakharchenko, N., Butenko, V., Savastieieva, O., Butenko, T., & Shyriaieva, L. (2018). Modern technologies of detection and prevention of corruption in emerging information society. *Problems and Perspectives in Management*, *16*(1), 58–67. doi:10.21511/ppm.16(1).2018.06

Mas, M., Fernández de Guevara, J., Robledo, J. C., Cardona, M., Lopez-Cobo, M., Righi, R., & Samoili, S. (2018). *The 2018 PREDICT Key Facts Report. An analysis of ICT R&D in the EU and beyond*. European Commission.

Masters, M., Velde, T., & McBagonluri, F. (2006). Rapid manufacturing in the hearing Industry. In N. Hopkinson, R. Hague, & P. Dickens (Eds.), *Rapid Manufacturing*. doi:10.1002/0470033991.ch12

Matei, A. I., & Matei, L. (2011). Assessing the anti-corruption strategies: Theoretical and empirical models. *Journal of Management and Strategy*, *2*(1), 23–40. doi:10.5430/jms.v2n1p23

Mathiyazhagan, K., Govindan, K., NoorulHaq, A., & Geng, Y. (2013). An ISM approach for the barrier analysis in implementing green supply chain management. *Journal of Cleaner Production*, *47*, 283–297. doi:10.1016/j.jclepro.2012.10.042

Matipira, L. (2015). *The Impact of Corporate Governance and Capacity Utilization on Zimbabwe Aviation Industry*. Christ University Press.

Mauro, P. (1998). Corruption: Causes, consequences, and agenda for further research. *Finance & Development*, *35*(1), 11–14.

McAfee, R. P., Mialon, H. M., & Williams, M. A. (2004). What is a barrier to entry? *The American Economic Review*, *94*(2), 461–465. doi:10.1257/0002828041302235

McCann, P., & Arita, T. (2006). Clusters and regional development: Some cautionary observations from the semiconductor industry. *Information Economics and Policy*, *18*(2), 157–180. doi:10.1016/j.infoecopol.2005.12.001

McDougall, P., Shane, S., & Oviatt, B. (1994). Explaining the formation of international new ventures: The limits of theories from international business research. *Journal of Business Venturing*, *9*(6), 469–487. doi:10.1016/0883-9026(94)90017-5

McGahan, A. M., Argyres, N., & Baum, J. A. C. (2004), Context, Technology and Strategy- Forging new Perspectives on the Industry Life Cycle. In Business Strategy over the Industry Lifecycle. Emerald Group Publishing Limited.

McGahan, A. M., & Porter, M. E. (1997). How Much Does Industry Matter, Really? *Strategic Management Journal*, *18*(S1), 15–30. doi:10.1002/(SICI)1097-0266(199707)18:1+<15::AID-SMJ916>3.0.CO;2-1

McNamara, G. M., Haleblian, J., & Dykes, B. J. (2008). The Performance Implications of Participating in an Acquisition wave: Early mover advantages, bandwagon effects, and the moderating influence of industry characteristics and acquirer tactics. *Academy of Management Journal*, *51*(1), 113–130. doi:10.5465/amj.2008.30755057

McNamara, G., & Bromiley, P. (1997). Decision Making in an Organizational Setting: Cognitive and Organizational Influences on Risk Assessment in Commercial Lending. *Academy of Management Journal*, *40*(5), 1063–1088.

McNiff, J. (2013). Action Research (3rd ed.). New York: Routledge. doi:10.4324/9780203112755

Menard, A. R., & Weill, L. (2016). Understanding the link between aid and corruption: A causality analysis. *Economic Systems*, *40*(2), 260–272. doi:10.1016/j.ecosys.2016.01.001

Meyer, K. E., & Gelbuda, M. (2006). Process perspectives in international business research in CEE. *Management International Review*, *46*(2), 143–164. doi:10.100711575-006-0042-5

Mietzner, M. (2020). Populist anti-scientism, religious polarisation, and institutionalized corruption: How Indonesia's democratic decline shaped its COVID-19 response. *Journal of Current Southeast Asian Affairs*, *39*(2), 227–249. doi:10.1177/1868103420935561

Mikhailov, A. P., Gorbatikov, E. A., & Kornilina, E. D. (2013). A System-Social Approach to the Modeling of Corruption. *Mediterranean Journal of Social Sciences*, *4*(9), 332. doi:10.5901/mjss.2013.v4n9p332

Milewski, J. (2017). *Additive Manufacturing of Metals: From Fundamental Technology to Rocket Nozzles, Medical Implants, and Custom Jewelry*. Springer. doi:10.1007/978-3-319-58205-4

Miller, D., & Ghen, M. (1994). Sources and consequences of competitive inertia: A study of the U.S. airline industry. *Administrative Science Quarterly*, *39*(1), 1–23. doi:10.2307/2393492

Miller, K. D. (1993). Industry and country effects on managers' perceptions of environmental uncertainties. *Journal of International Business Studies*, *24*(4), 693–714.

Miller, K. D., & Bromiley, P. (1990). Strategic Risk and Corporate Performance: An Analysis of Alternative Risk Measures. *Academy of Management Journal*, *33*(4), 756–779.

Milliyet. (2019). *Yemeksepeti*. https://www.milliyet.com.tr/pembenar/yemeksepeti-589-milyon-dolara-satildi-2054297

Miotti, L., & Sachwald, F. (2003). Co-operative R&D: why and with whom?: An integrated framework of analysis. *Research Policy*, *32*(8), 1481–1499. doi:10.1016/S0048-7333(02)00159-2

Mishra, D., & Satapathy, S. (2020). An Integrated SWARA, QFD and ISM approach for Agricultural injuries in India. *International Journal of Decision Support System Technology*, *12*(2), 1–24. doi:10.4018/IJDSST.2020040101

Mishra, M. K. (2010). Why is eBay the most successful online auction? *Global Journal of Management and Business Research*, *10*(9), 62–65.

Mishra, S., Sinha, A., Sharif, A., & Suki, N. M. (2020). Dynamic linkages between tourism, transportation, growth and carbon emission in the USA: Evidence from partial and multiple wavelet coherence. *Current Issues in Tourism*, *23*(21), 2733–2755. doi:10.1080/13683500.2019.1667965

Mitchell, T. R. (1982). Motivation: New directions for theory, research, and practice. *Academy of Management Review*, *7*(1), 80–88.

Mlachila, M., Cui, L., Jidoud, A., Newiak, M., Radzewicz-Bak, B., Takebe, M., & Zhang, J. (2016). *Financial development in Sub-Saharan Africa: promoting inclusive and sustainable growth (No. 16/11)*. International Monetary Fund.

Molero, J., & García, A. (2008). The innovative activity of foreign subsidiaries in the Spanish innovation system: An evaluation of their impact from a sectoral taxonomy approach. *Technovation*, *28*(11), 739–757. doi:10.1016/j.technovation.2008.03.005

Molero, J., & Heijs, J. (2002). Differences of innovative behaviour between national and foreign firms: Measuring the impact of foreign firms on national innovation systems. *International Journal of Entrepreneurship and Innovation Management*, *2*(2/3), 122–145. doi:10.1504/IJEIM.2002.000478

Möller, K., & Svahn, S. (2009). How to influence the birth of new business fields—Network perspective. *Industrial Marketing Management*, *38*(4), 450–458.

Monin, P., Noorderhaven, N., Varra, E., & Kroon, D. (2013). Giving sense to and making sense of justice in postmerger integration. *Academy of Management Journal*, *56*(1), 256–284. doi:10.5465/amj.2010.0727

Montag, C., Becker, B., & Gan, C. (2016). The multipurpose application WeChat: A reviewon recent research. *Frontiers in Psychology*, *9*, 2247. https://doi.org/10.3389/fpsyg.2018.02247

Moreira, A. C., Ramos, M., Ferraz, L., & Martins, D. (2018). The internationalization process of a born global: A case study of a beverage firm. In O. Rua (Ed.), *Entrepreneurial orientation and opportunities for global economic growth* (pp. 46–68). IGI Global. doi:10.4018/978-1-5225-6942-8.ch003

Moreira, S., Markus, A., & Laursen, K. (2018). Knowledge diversity and coordination: The effect of intrafirm inventor task networks on absorption speed. *Strategic Management Journal*, *39*(9), 2517–2546. doi:10.1002mj.2914

Mort, G. S., & Weerawardena, J. (2006). Networking capability and international entrepreneurship - How networks functions in Australian born global firms. *International Marketing Review*, *23*(5), 549–572. doi:10.1108/02651330610703445

Mount, D. J. (2013). Putting the Dollar signs on quality: The cost of experienced problems in the hotel industry. *International Journal of Hospitality & Tourism Administration*, *14*(1), 87–97. doi:10.1080/15256480.2013.753809

Mukherjee, D. (2018). *Corruption in International Business : Does Economic Globalization Help ? Global business review.* Sage Publications. doi:10.1177/0972150917713841

Multilingual Dictionary. (2013). *Kernerman English Multilingual Dictionary*. K Dictionaries Ltd.

Muñoz López, L., Antón Martínez, P., & San Agustín García, A. (2017). *Informe anual del sector TIC y de los contenidos en España 2017*. Gobierno de España.

Muranda, Z., Frank, R., & Saruchera, F. (2014). Land as the nexus in youth, female unemployment and poverty reduction. Harare: University of Zimbabwe (U.Z.) Publications.

Mutlubiev. (2020). *Mutlubiev About Us*. https://mutlubiev.com

Nadeem, M., & Ahmad, R. (2016). Impact of business process re-engineering on the performance of banks in Pakistan. *Business and Economics Journal*, *7*(1), 1–3.

Nahmias, S., & Olsen, T. (2015). *Production and Operations Analysis* (7th ed.). Waveland.

Narula, R. (2014). Exploring the paradox of competence-creating subsidiaries: Balancing bandwidth and dispersion in MNEs. *Long Range Planning*, *47*(1-2), 4–15. doi:10.1016/j.lrp.2013.10.006

NASA. (2020). *Overview: Weather, Global Warming and Climate Change*. Retrieved January 21, 2021 from https://climate.nasa.gov/resources/global-warming-vs-climate-change/

Nave, D. (2002). How to compare six sigma, lean and the theory of constraints. *Toc-Cga.Org, 35*(3), 73–80. Retrieved from http://www.toc-cga.org/upload/reference/3.pdf

Nepal, R., al Irsyad, M. I., & Nepal, S. K. (2019). Tourist arrivals, energy consumption and pollutant emissions in a developing economy-implications for sustainable tourism. *Tourism Management*, *72*, 145–154. doi:10.1016/j.tourman.2018.08.025

Ngoasong, M. Z. (2015). Digital entrepreneurship in emerging economies: The role of ıcts and local context. *42nd AIB-UKI Conference*.

Ng, T. H., Lye, C. T., & Lim, Y. S. (2016). A decomposition analysis of CO2 emissions: Evidence from Malaysia's tourism industry. *International Journal of Sustainable Development and World Ecology*, *23*(3), 266–277. doi:10.1080/13504509.2015.1117534

Nicholson, N. (2013). The invention of leadership. *Business Strategy Review*, *24*(2), 14–29. doi:10.1111/j.1467-8616.2013.00943.x

Nivre, J., Allwood, J., Grönqvist, L., Gunnarsson, M., Ahlsén, E., Vappula, H., . . . Ottesjö, C. (2004). *Göteborg Transcription Standard Version 6.4.* Retrieved September 1, 2019, from University of Gothenburg, Sweden website: https://www.researchgate.net/publication/268503487_Goteborg_Transcription_Standard_Version_64

Nocker, E., Bowen, H. P., Stadler, C., & Matzler, K. (2016). Capturing relatedness: Comprehensive measures based on secondary data. *British Journal of Management*, *27*(1), 197–213.

Norton, W. I., & Moore, W. T. (2006). The influence of entrepreneurial risk assessment on venture launch or growth decisions. *Small Business Economics*, *26*(3), 215–226.

Nouban, F., & Abazid, M. (2017). An overview of total quality management in construction engineering. *Academic Research International*, *8*(4), 68–74.

Novak, J. I. (2019). Self-directed learning in the age of open source: Open hardware and 3D printing. In E. Ossiannilsson (Ed.), Ubiquitous Inclusive Learning in a Digital Era (pp. 154–178). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-6292-4.ch007

Novak, J. I., & Loy, J. (2017). Digital technologies and 4D customized design: Challenging conventions with responsive design. In V. C. Bryan, A. T. Musgrove, & J. R. Powers (Eds.), Handbook of Research on Human Development in the Digital Age (pp. 403–426). Hershey, PA: IGI Global.

Novak, J., Burton, D., & Crouch, T. (2019). Aerodynamic test results of bicycle helmets in different configurations: Towards a responsive design. *Proceedings of the Institution of Mechanical Engineers. Part P, Journal of Sports Engineering and Technology*, *233*(2), 268–276. doi:10.1177/1754337118822613

Novotná, L., Martins, I., & Moreira, A. C. (2017). Trade between the Czech Republic and Portugal: Analysis of the 2000-2015 Period. In T. Dorożyński & A. Kuna-Marszałek (Eds.), Outward foreign direct investment (FDI) in emerging market economies (pp. 200–225). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2345-1.ch010

Nunan, F. (2007). Reducing poverty through fisheries co-management: An analysis of design and intentions in Uganda. *Journal of International Development*, *19*(8), 1151–1164. doi:10.1002/jid.1391

Obi-Uzu, B. (2018). Economic Globalization in the Face of Recession, Corruption and Insecurity. *International Journal of Advanced Studies in Ecology*, *Development and Sustainability*, *5*(1), 12–19.

OECD-UNEP. (2011). *Climate Change and Tourism Policy in OECD Countries*. OECD Publishing.

Ogbo, A. I., Attah, E. Y., Ewurum, U. J. F., & Ugbam, C. O. (2015). Business process re-engineering and performance of commercial banks in North Central Nigeria. *International Journal of Contemporary Applied Sciences*, *2*(10), 1–13.

Olavson, T., & Fry, C. (2008). Spreadsheet decision-support tools: Lessons learned at Hewlett-Packard. *Interfaces*, *38*(4), 300–310. doi:10.1287/inte.1080.0368

Olejnik, E., & Swoboda, B. (2012). SMEs' internationalisation patterns: Descriptives, dynamics and determinants. *International Marketing Review*, *29*(5), 466–495. doi:10.1108/02651331211260340

Oliveira, A. & Gimeno, A. (2014). *Supply Chain Management Strategy: Using SCM to Create Greater Corporate Efficiency and Profits*. Pearson FT Press.

Oliver, C., & Holzinger, I. (2008). The Effectiveness of Strategic Political Management: A Dynamic Capabilities Framework. *Academy of Management Review*, *33*(2), 496–520. doi:10.5465/amr.2008.31193538

Omor. (2020). *OMOR*. Retrieved from http://operations-management-research.essec.edu/home

Onchari, D. G. The Relationship between Corruption and Unemployment Rates in Kenya. *Akademi Sosyal Bilimler Dergisi, 6*(17), 309-318.

Owusu, E. K., Chan, A. P., & Hosseini, M. R. (2020). Impacts of anti-corruption barriers on the efficacy of anti-corruption measures in infrastructure projects: Implications for sustainable development. *Journal of Cleaner Production*, *246*, 119078. doi:10.1016/j.jclepro.2019.119078

Özbek, A., Esmer, Y., & Şaylan, O. (2018). Model proposal for new product development in Turkish garment sector in the context of e-entrepreneurship. *Iconsr 2018-1th International Conference on Social Science Research*.

Özdener. (2018), *E-perakende hizmet kalitesinin marka değerine etkisi: Trendyol Örneği* [Unpublished master dissertation]. İstanbul Gelişim Üniversitesi, İstanbul, Turkey.

Özeroğlu, A. C. (2018). *Girişimcilik faaliyetlerinde e-ticaret uygulamaları: Inovasyon ve dijital girişimcilik* [Unpublished master dissertation]. İstanbul Gelişim Üniversitesi, İstanbul, Turkey.

Öztaş, Ş. (2009), *E-Ticaret şirketlerinin markalaşma süreci: Amazon.Com ve Yemeksepeti.Com* [Unpublished master dissertation]. Dokuz Eylül Üniversitesi, İzmir, Turkey.

Öztürk, E., & Koç, K. (2017). Endüstri 4.0 ve mobilya endüstrisi. *İleri Teknoloji Bilimleri Dergisi, 6*(3), 786-794.

Öztürk, M. D., & Arslan, İ. K. (2016). *Türkiye'de kadın girişimcilik: Kadınları girişimciliğe yönelten faktörler, karşılaştıkları sorunlar ve çözüm önerileri* [Lexical characteristics of Turkish language]. İstanbul Ticaret Üniversitesi Dış Ticaret Enstitüsü.

Pablo, A. L. (1994). Determinants of Acquisition Integration Level: A Decision-Making Perspective. *Academy of Management Journal*, *37*(4), 803–836.

Palich, L. E., Cardinal, L. B., & Miller, C. C. (2000). Curvilinearity in the diversification–performance linkage: An examination of over three decades of research. *Strategic Management Journal*, *21*(2), 155–174.

Panayotou, T. (1993). *Empirical tests and policy analysis of environmental degradation at different stages of economic development*. ILO World Employment Programme Research Working Papers. Working Papers Technology and Employment Programme International Labour Organization. Retrieved from https://ideas.repec.org/p/ilo/ilowps/992927783402676.html

Pansiri, J. (2014). Tourist motives and destination competitiveness: A gap analysis perspective. *International Journal of Hospitality & Tourism Administration*, *15*(3), 217–247. doi:10.1080/15256480.2014.925718

Papachristos, G. (2014). Transition inertia due to competition in supply chains with remanufacturing and recycling: A systems dynamics model. *Environmental Innovation and Societal Transitions*, *12*, 47–65. doi:10.1016/j.eist.2014.01.005

Papanastassiou, M., Pearce, R., & Zanfei, A. (2019). Changing perspectives on the internationalization of R&D and innovation by multinational enterprises: A review of the literature. *Journal of International Business Studies*, 1–42.

Papavasileiou, E. F., & Tzouvanas, P. (2020). Tourism Carbon Kuznets-Curve Hypothesis: A Systematic Literature Review and a Paradigm Shift to a Corporation-Performance Perspective. *Journal of Travel Research*, *0*(0), 1–16. doi:10.1177/0047287520915276

Paramati, S. R., Alam, M. S., & Lau, C. K. M. (2018). The effect of tourism investment on tourism development and CO2 emissions: Empirical evidence from the EU nations. *Journal of Sustainable Tourism*, *26*(9), 1587–1607. doi:10.1080/09669582.2018.1489398

Park, B., & Khanoi, O. (2017). How does the globalization of firms affect corruption in developing economies? *Journal of Korea Trade*, *21*(3), 256–270. doi:10.1108/JKT-02-2017-0022

Park, K., & Jang, S. C. (2014). Hospitality finance and managerial accounting research: Suggesting an interdisciplinary research agenda. *International Journal of Contemporary Hospitality Management*, *26*(5), 751–777. doi:10.1108/IJCHM-12-2013-0554

Pasculli, L., & Ryder, N. (2019). Corruption and globalization. Towards an interdisciplinary scientific understanding of corruption as a global crime. In Corruption in the Global Era: Causes, Sources and Forms of Manifestation. New York: Routledge.

Paton, R. A., & Wagner, R. (2014). Management education makes a difference: Enhancing German engineering performance. *Long Range Planning*, *47*(5), 277–298. doi:10.1016/j.lrp.2012.06.002

Patton, M. Q. (2015). Qualitative Evaluation and Research Methods. New York: Sage.

Pehlivanoğlu, F., & Kayan, K. (2019). Türkiye'de girişimcilik: Mevcut durum analizi ve çözüm önerileri. *Kırklareli Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, *8*(1), 58–78.

Pehrsson, A. (2006). Business relatedness and performance: A study of managerial perceptions. *Strategic Management Journal*, *27*(3), 265–282.

Peng, J., Quan, J., & Zhang, S. (2013). Mobile phone customer retention strategies and Chinese e-commerce. *Electronic Commerce Research and Applications*, *12*(5), 321–327. doi:10.1016/j.elerap.2013.05.002

Peng, M. W. (2009). *Global strategy* (2nd ed.). South-Western Cengage Learning.

Peng, M. W. (2013). *Global Strategic Management* (3rd ed.). South-Western.

Pennings, J. M., Lee, K., & Van, W. A. (1998). Human Capital, Social Capital, and Firm Dissolution. *Academy of Management Journal*, *41*(4), 425–440.

Perez-Franco, R. (2014). Is your supply chain strategy holding back innovation? *Supply Chain Management Review*, (July/August), 8–9.

Perrow, C. (1984). Normal accidents: Living with high-risk technologies. New York: Basic Books.

Persson, T., & Tabellini, G. (2006). Democracy and development: The devil in the details. *The American Economic Review*, *96*(2), 319–324. doi:10.1257/000282806777212396

Pezzuto, I. (2019). Turning globalization 4.0 into a real and sustainable success for all stakeholders. *Journal of Governance and Regulation*, *8*(1), 8–18. doi:10.22495/jgr_v8_i1_p1

Pfeffer, J. (1982). Organizations and organization theory. New York: Harper & Row.

Pfeffer, J., & Salancik, G. R. (1978). The External Control of Organizations: A Resource Dependence Perspective. New York: Harper & Row.

Pfeffer, J., & Leblebici, H. (1973). Executive Recruitment and the Development of Interfirm Organizations. *Administrative Science Quarterly*, *18*(4), 449–461. doi:10.2307/2392198

Phelps, N. A. (1993). Branch plant and the evolving spatial division of labour: A study of material linkage change in the Northern Region of England. *Regional Studies*, *27*(2), 87–101. doi:10.1080/00343409312331347405

Phillips, P. C. (1996). Econometric model determination. *Econometrica*, *64*(4), 763–812. doi:10.2307/2171845

Piekkari, R., Welch, C., & Paavilainen, E. (2009). The case study as disciplinary convention: Evidence from international business journals. *Organizational Research Methods*, *12*(3), 567–589. doi:10.1177/1094428108319905

Pigram, J. J. (1980). Environmental implications of tourism development. *Annals of Tourism Research*, *7*(4), 554–583. doi:10.1016/0160-7383(80)90049-3

Pinto, L., Ribeiro, M., & Moreira, A. C. (2018). Challenging the theoretical lenses of internationalization: A case study analysis. In C. Machado & P. Davim (Eds.), Enhancing Competitive Advantage with Dynamic Management and Engineering (pp. 112–137). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-5360-1.ch005

Piskorski, M. J. (2013). Finn Brunton: Spam: A Shadow History of the Internet. *Administrative Science Quarterly*, *59*(3), 29–30. doi:10.1177/0001839213518029

Plantin, J.-C., Lagoze, C., Edwards, P. N., & Sandvig, S. (2018). Infrastructure studies meet platform studies in the age of Google and Facebook. *New Media & Society*, *20*(1), 293–310.

Porter, L. W., & Lawler, E. E. (1968). Managerial attitudes and performance. Cheltenham: Edward Edgar Publishing.

Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors. New York: Free Press.

Porter, M. E. (1979). How competitive forces shape strategy. *Harvard Business Review*, (March–April), 21–38. PMID:18271320

Porter, M. E. (1981). The Contributions of Industrial Organization to Strategic Management. *Academy of Management Review*, *6*(4), 609–620.

Porter, M. E. (2008). The five competitive forces that shape strategy. Cambridge: Harvard Business Review, (January), 78–93. PMID:18271320

Porto, N., & Ciaschi, M. (2020). Reformulating the tourism-extended environmental Kuznets curve: A quantile regression analysis under environmental legal conditions. *Tourism Economics*, *2020*, 1–24. doi:10.1177/1354816620912556

PWC. (2017). *Five forces that will reshape the global landscape of anti-bribery and anti-corruption.* Retrieved February 7, 2021 from https://www.pwc.co.za/en/assets/pdf/anti-corruption-south-africa.pdf

Qiao, H., Zheng, F., Jiang, H., & Dong, K. (2019). The greenhouse effect of the agriculture-economic growth-renewable energy nexus: Evidence from G20 countries. *The Science of the Total Environment*, *671*, 722–731. doi:10.1016/j.scitotenv.2019.03.336 PMID:30939325

Qureshi, M. I., Hassan, M. A., Hishan, S. S., Rasli, A. M., & Zaman, K. (2017). Dynamic linkages between sustainable tourism, energy, health and wealth: Evidence from top 80 international tourist destination cities in 37 countries. *Journal of Cleaner Production*, *158*, 143–155. doi:10.1016/j.jclepro.2017.05.001

Qu, W. G., Pinsonneault, A., & Oh, W. (2011). Influence of Industry Characteristics on Information Technology Outsourcing. *Journal of Management Information Systems*, *27*(4), 99–127. doi:10.2753/MIS0742-1222270404

Raj, T., Shankar, R., & Suhaib, M. (2008). An ISM approach for modeling the enablers of flexible manufacturing system: The case for India. *International Journal of Production Research*, *46*(24), 6883–6912. doi:10.1080/00207540701429926

Rama, R. (2009). Foreign investment innovation. A review of selected policies. *The Journal of Technology Transfer*, *33*(4), 353–363. doi:10.100710961-007-9050-2

Rama, R., & Ferguson, D. (2007). Emerging districts facing structural reform: The Madrid electronics district and the reshaping of the Spanish telecom monopoly. *Environment & Planning A*, *39*(9), 2207–2231. doi:10.1068/a38270

Randolph, W. A., & Dess, G. G. (1984). The congruence perspective of organization design: A conceptual model and multivariate research approach. *Academy of Management Review*, *9*(1), 114–127. doi:10.5465/amr.1984.4278106

Reilly, P. (2015). Managing across borders and cultures. *Strategic HR Review*, *14*(1/2), 36–41. doi:10.1108/SHR-07-2014-0042

Rennie, W. R. (1993). Global competitiveness: Born global. *The McKinsey Quarterly*, *4*, 45–52.

Rennings, K. (2000). Redefining innovation—Eco-innovation research and the contribution from ecological economics. *Ecological Economics*, *32*(2), 319–332.

Rialp, A., Rialp, J., & Knight, G. A. (2005). The phenomenon of early internationalizing firms: What do we know after a decade (1993–2003) of scientific inquiry? *International Business Review*, *14*(2), 147–166. doi:10.1016/j.ibusrev.2004.04.006

Ribau, C. P., Moreira, A. C., & Raposo, M. (2018). SME internationalization research: Mapping the state of the art. *Canadian Journal of Administrative Sciences*, *35*(2), 280–303. doi:10.1002/cjas.1419

Ribau, C. P., Moreira, A. C., & Raposo, M. (2019). The role of exploitative and exploratory innovation in export performance: An analysis of plastics industry SMEs. *European Journal of International Management*, *13*(2), 224–246. doi:10.1504/EJIM.2019.098149

Ribau, C., Moreira, A. C., & Raposo, M. (2015). Internationalisation of the firm theories: A schematic synthesis. *International Journal of Business and Globalisation*, *15*(4), 528–554. doi:10.1504/IJBG.2015.072535

Ribau, C., Moreira, A. C., & Raposo, M. (2017). SMEs innovation capabilities and export performance: An entrepreneurial orientation view. *Journal of Business Economics and Management*, *18*(5), 920–934. doi:10.3846/16111699.2017.1352534

Robinson, J. A., & Acemoglu, D. (2012). Why nations fail: The origins of power, prosperity, and poverty. Johannesburg: Profile Pubhishers.

Robinson, K., & McDougall, P. (2001). Entry barriers and new venture performance: A comparison of universal and contingency approaches. *Strategic Management Journal*, *22*(6-7), 659–685. doi:10.1002mj.186

Robinson, M. (Ed.). (1998). *Corruption and Development*. Dublin: Cass Frank & Sons.

Rode, M., & de Viteri, A. S. (2018). Expressive attitudes to compensation: The case of globalization. *European Journal of Political Economy*, *54*, 42–55. doi:10.1016/j.ejpoleco.2018.05.007

Royer, S. (2012). Strategic management and online selling: creating competitive advantage with intangible web goods. New York City: Routledge.

Rumelt, R. P. (1991). How Much Does Industry Matter? *Strategic Management Journal*, *12*(3), 167–185. doi:10.1002mj.4250120302

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist*, *55*(1), 68–78.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Saad, G. H. (1982). An overview of production planning models: Structural classification and empirical assessment. *International Journal of Production Research*, *20*(1), 105–114. doi:10.1080/00207548208947752

Sadeghi, A., Wachsmann, C., & Waidner, M. (2015). Security and privacy challenges in Industrial Internet of Things. *52nd ACM/EDAC/IEEE Design Automation Conference.* IEEE. 10.1145/2744769.2747942

Sage, A. (1977). Interpretive structural modeling: Methodology for large-scale systems. New York: McGraw-Hill.

Sandström, A., Crona, B., & Bodin, Ö. (2014). Legitimacy in co-management: The impact of preexisting structures, social networks and governance strategies. *Environmental Policy and Governance*, *24*(1), 60–76. doi:10.1002/eet.1633

Sandström, C. (2016). The non-disruptive emergence of an ecosystem for 3D Printing— Insights from the hearing aid industry's transition 1989–2008. *Technological Forecasting and Social Change*, *102*, 160–168. doi:10.1016/j.techfore.2015.09.006

Santangelo, G. D. (2009). MNCs and linkages creation: Evidence from a peripheral area. *Journal of World Business*, *44*(2), 192–205. doi:10.1016/j.jwb.2008.05.009

Santangelo, G. D., & Meyer, K. E. (2017). Internationalization as an evolutionary process. *Journal of International Business Studies*, *48*(9), 1114–1130. doi:10.105741267-017-0119-3

Sanz Menéndez, L., Fernández Carro, J. R., & García, C. E. (1999). Centralidad y cohesión en las redes de colaboración empresarial en la I+D subsidiada. *Papeles de Economía*, *81*, 219–241.

Sarkodie, S. A., & Strezov, V. (2019). A review on Environmental Kuznets Curve hypothesis using bibliometric and meta-analysis. *The Science of the Total Environment*, *649*, 128–145. doi:10.1016/j.scitotenv.2018.08.276 PMID:30172133

Sarkodie, S. A., & Strezov, V. (2019). Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries. *The Science of the Total Environment*, *646*, 862–871. doi:10.1016/j.scitotenv.2018.07.365 PMID:30064112

Saruchera, F. (2014). *Determinants of commercialization of technological innovations in developing economies: a study of Zimbabwe's research institutes* (Doctoral dissertation). Durban: University of KwaZulu-Natal.

Saruchera, F., & Phiri, M. A. (2016). Technological Innovations Performance And Public-Private-partnerships. *Corporate Ownership & Control*, 549-557. Retrieved from http://www.virtusinterpress.org/IMG/pdf/COC__Volume_13_Issue_4_Summer_2016_Continued4_.pdf#page=23

Saruchera, F. (2020). Determinants of effective high-risk cargo logistics at sea ports: A case study. *Journal of Transport and Supply Chain Management*, *14*, 13. doi:10.4102/jtscm.v14i0.488

Saruchera, F., & Asante-Darko, D. (2021). Reverse logistics, organizational culture and firm operational performance: Some empirical evidence. *Business Strategy and Development*, *4*(1). Advance online publication. doi:10.1002/bsd2.161

Saruchera, F., & Phiri, M. A. (2016). Technological Innovations Performance and Public-Private-partnerships. *Corporate Ownership & Control*, *13*(4), 549–557. doi:10.22495/cocv13i4c4p4

Sasi, V., & Arenius, P. (2008). International new ventures and social networks: Advantage or liability? *European Management Journal*, *26*(6), 400–411. doi:10.1016/j.emj.2008.09.008

Satapathy, S. (2014). ANN, QFD and ISM approach for framing electricity utility service in India for consumer satisfaction. *International Journal of Services and Operations Management*, *18*(4), 404–428. doi:10.1504/IJSOM.2014.063243

Sauvant, K. P. (2009). *FDI Protectionism is on the Rise*. The World Bank. doi:10.1596/1813-9450-5052

Savic, D. (2019). From digitization, through digitalization, to digital transformation information discovery. *Tecnology. Strategies (La Jolla, Calif.)*, *43*(1), 36–39.

Sawalha, N. N., Elian, M. I., & Suliman, A. H. (2016). Foreign capital inflows and economic growth in developed and emerging economies: A comparative analysis. *Journal of Developing Areas*, *50*(1), 237–256. doi:10.1353/jda.2016.0022

Scherer, F. M., & Ross, D. (1990). *Industrial Market Structure and Economic Performance*. Houghton Mifflin.

Schmalensee, R. (1985). Do markets differ much? *The American Economic Review*, *75*, 341–351.

Schmidt, T., & Sofka, W. (2009). Liability of foreignness as a barrier to knowledge spillovers: Lost in translation? *Journal of International Management*, *15*(4), 460–474. doi:10.1016/j.intman.2009.03.003

Scholl, W., & Schermuly, C. C. (2020). The impact of culture on corruption, gross domestic product, and human development. *Journal of Business Ethics*, *162*(1), 171–189. doi:10.100710551-018-3977-0

Schoonhoven, C. B. (1981). Problems with contingency theory: Testing assumptions hidden within the language of contingency. *Administrative Science Quarterly*, *26*(3), 349–377. doi:10.2307/2392512 PMID:10252610

Schoonhoven, C. B., & Jelinek, M. (1990). Dynamic tension in innovative, high-technology firms: Managing rapid technological change through organizational structure. In M. A. Von Glinow & S. A. Mohrman (Eds.), *Managing Complexity in High-Technology Organizations*. Oxford University Press.

Schrage, L. (2015). Optimization Modeling with LINGO (6th ed.). Chicago: Lindo Systems Inc.

Schueffel, P., Baldegger, R., & Amann, W. (2014). Behavioral patterns in born-again global firms: Towards a conceptual framework of the internationalization activities of mature SMEs. *Multinational Business Review*, *22*(4), 418–441. doi:10.1108/MBR-06-2014-0029

Schuler, D. A., Rehbein, K., & Cramer, R. D. (2002). Pursuing Strategic Advantage Through Political Means: A Multivariate Approach. *Academy of Management Journal*, *45*(4), 659–672.

Schultz, L., Duit, A., & Folke, C. (2011). Participation, Adaptive Co-management, and Management Performance in the World Network of Biosphere Reserves. *World Development*, *39*(4), 662–671. doi:10.1016/j.worlddev.2010.09.014

Şeker, A., Doğan, M., & Elitaş, B. L. (2016). KOBİ'lerde girişimcilik değerleri ve dış ticaret faaliyetleri arasındaki ilişki: Sanayi işletmeleri örneği. *İşletme Araştırmaları Dergisi, 8*(2), 198-223.

Sery, S., Presti, V., & Shobrys, D. E. (2001). Optimization models for restructuring BASF North America's distribution system. *Interfaces*, *31*(3), 55–65. doi:10.1287/inte.31.3.55.9635

Sghaier, A., Guizani, A., Ben Jabeur, S., & Nurunnabi, M. (2019). Tourism development, energy consumption and environmental quality in Tunisia, Egypt and Morocco: A trivariate analysis. *GeoJournal*, *84*(3), 593–609. doi:10.100710708-018-9878-z

Shabbir, M. S., & Muhammad, I. (2019). The dynamic impact of foreign portfolio investment on stock prices in Pakistan. *Transnational Corporations Review*, *11*(2), 166–178. doi:10.1080/19186444.2019.1616508

Shahbaz, M., & Sinha, A. (2019). Environmental Kuznets curve for CO2 emissions: A literature survey. *Journal of Economic Studies (Glasgow, Scotland)*, *46*(1), 106–168. doi:10.1108/JES-09-2017-0249

Shaheen, K., Zaman, K., Batool, R., Khurshid, M. A., Aamir, A., Shoukry, A. M., Sharkawy, M. A., Aldeek, F., Khader, J., & Gani, S. (2019). Dynamic linkages between tourism, energy, environment, and economic growth: Evidence from top 10 tourism-induced countries. *Environmental Science and Pollution Research International*, *26*(30), 31273–31283. doi:10.100711356-019-06252-1 PMID:31468352

Shakouri, B., Khoshnevis Yazdi, S., & Ghorchebigi, E. (2017). Does tourism development promote CO2 emissions? *Anatolia*, *28*(3), 444–452. doi:10.1080/13032917.2017.1335648

Shane, S. (2001). Technology opportunity and firm formation. *Management Science*, *47*(2), 205–220. doi:10.1287/mnsc.47.2.205.9837

Shane, S., & Stuart, T. (2002). Organizational Endowments and the Performance of University Start-ups. *Management Science*, *48*(1), 154–170. doi:10.1287/mnsc.48.1.154.14280

Sharma, S., & Crossler, R. E. (2014). Disclosing too much? Situational factors affecting information disclosure in social commerce environment. *Electronic Commerce Research and Applications*, *13*(5), 305–319. doi:10.1016/j.elerap.2014.06.007

Sheetz, M. (2017). Technology killing off corporate America: Average lifespan of companies under twenty years. *CNBC*. Retrieved from, https://www.cnbc.com/2017/08/24/technology-killing-off-corporations-average-lifespan-of-company-under-20-years.html

Shen, W., & Cannella, A. A. (2002). Revisiting the Performance Consequences of CEO Succession: The Impacts of Successor Type, Postsuccession Senior Executive Turnover, and Departing CEO Tenure. *Academy of Management Journal*, *45*(4), 717–733.

Sherafatian-Jahromi, R., Othman, M. S., Law, S. H., & Ismail, N. W. (2017). Tourism and CO2 emissions nexus in Southeast Asia: New evidence from panel estimation. *Environment, Development and Sustainability*, *19*(4), 1407–1423. doi:10.100710668-016-9811-x

Sheremata, W. A. (2004). Competing through Innovation in Network Markets: Strategies for Challengers. *Academy of Management Review*, *29*(3), 359–377. doi:10.5465/amr.2004.13670986

Sher, M. M., & Kim, S. L. (2014). Supply Chain Coordination with Quantity Discount for Seasonal Demand. *International Journal of Supply Chain Management*, *3*(3), 7–15.

Shleifer, A., & Vishny, R. W. (1993). Corruption. *The Quarterly Journal of Economics*, *108*(3), 599–617. doi:10.2307/2118402

Sila, I. (2013). Factors affecting the adaptation of B2B e-commerce technologies. *Electronic Commerce Research*, *13*(2), 199–236. doi:10.100710660-013-9110-7

Sims, L., & Sinclair, A. J. (2008). Learning Through Participatory Resource Management Programs: Case Studies From Costa Rica. *Adult Education Quarterly*, *58*(2), 151–168. doi:10.1177/0741713607309802

Singhal, J., & Singhal, K. (2007). Holt, Modigliani, Muth, and Simon's work and its role in the renaissance and evolution of operations management. *Journal of Operations Management*, *25*(2), 300–309. doi:10.1016/j.jom.2006.06.003

Singh, J. (2007). Asymmetry of Knowledge Spillovers between MNCs and Host Country Firms. *Journal of International Business Studies*, *38*(5), 764–786. doi:10.1057/palgrave.jibs.8400289

Singh, N., Cranage, D., & Lee, S. (2014). Green strategies for hotels: Estimation of recycling benefits. *International Journal of Hospitality Management*, *43*(1), 13–22. doi:10.1016/j.ijhm.2014.07.006

Singh-Renton, S., & McIvor, I. (2015). *Review of current fisheries management performance and conservation measures in the WECAFC area.* FAO Fisheries and Aquaculture Technical Paper No. 587.

Singh, U. S., & Mishra, U. S. (2014). Supply Chain Management through Vertical Coordination in Vegetable Industry. *International Journal of Supply Chain Management*, *3*(3), 148–154.

Situngkir, H., & Khanafiah, D. (2006, October). Theorizing corruption through agent-based modeling. In *9th Joint International Conference on Information Sciences (JCIS-06)* (pp. 561-564). Paris: Atlantis Press.

Sjöberg, M. (2005). *Ledarskap och beslutsfattande under stress vid komplexa olyckshändelser inom svensk räddningstjänst : en kvalitativ intervjuvuundersökning*. Karlstad: Försvarshögskolan, Institutionen för ledarskap och management Karlstad.

Slack, N., Brandon-Jones, A., & Johnston, R. (2013). *Operations management* (7th ed.). Pearson.

Slesman, L., Baharumshah, A. Z., & Wohar, M. E. (2015). Capital inflows and economic growth: Does the role of institutions matter? *International Journal of Finance & Economics*, *20*(3), 253–275. doi:10.1002/ijfe.1514

Smith, A., & Yousef, H. (2012). Kodak files for bankruptcy. *CNN Money*. Retrieved from https://money.cnn.com/2012/01/19/news/companies/kodak_bankruptcy/index.htm

Smith, A. N., & Fischer, E., & Yongjian. (2012). How does brand-related user generated content differ across YouTube, Facebook and Twitter? *Journal of Interactive Marketing*, *26*(2), 102–113.

Sönmez, N. (1995). Ortak Geleceğimiz Stockholm 1972-Rio 1992 ve Sonrası. *Yeni Türkiye Dergisi*, *1*(5), 193–209.

Soylu, A. (2018). Endüstri 4.0 ve girişimcilikte yeni yaklaşımlar. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *0*(32), 43–57.

Srholec, M. (2009). Does foreign ownership facilitate cooperation on innovation? Firm-level evidence from the enlarged European Union. *European Journal of Development Research*, *21*(1), 47–62. doi:10.1057/ejdr.2008.9

Srholec, M. (2015). Understanding the diversity of cooperation on innovation across countries: Multilevel evidence from Europe. *Economics of Innovation and New Technology*, *24*(1-2), 159–182. doi:10.1080/10438599.2014.897864

Srinivasan, R. (2011). Business process re-engineering. New Delhi: Tata McGraw-Hill Education Pvt. Ltd.

Stanisauskaite, V., & Kock, S. (2016). The dynamic development of international entrepreneurial networks. In H. Etemad, S. Denicolai, B. Hagen, & A. Zucchella (Eds.), The changing global economy and its impact on international entrepreneurship (pp. 119–135). Massachusetts: Edward Elgar. doi:10.4337/9781783479849.00012

Steen, M., & Hansen, G. H. (2014). Same Sea, Different Ponds: Cross-Sectorial Knowledge Spillovers in the North Sea. *European Planning Studies*, *22*(10), 2030–2049. doi:10.1080/09654313.2013.814622

Stephan, K. E., Penny, W. D., Daunizeau, J., Moran, R. J., & Friston, K. J. (2009). Bayesian model selection for group studies. *NeuroImage*, *46*(4), 1004–1017. doi:10.1016/j.neuroimage.2009.03.025 PMID:19306932

Suarez, F. F., Grodal, S., & Gotsopoulos, A. (2015). Perfect timing? Dominant category, dominant design, and the window of opportunity for firm entry. *Strategic Management Journal*, *36*(3), 437–448. doi:10.1002mj.2225

Sudrajat, J., Rahman, M. A., & Sianturi, A., & Vendy. (2016). Entrepreneurship learning process by using swot analysis. *Journal The Winners*, *17*(1), 67–75.

Sui, S., Yu, Z., & Baum, M. (2012). Prevalence and longitudinal trends of early internationalisation patterns among Canadian SMEs. *International Marketing Review*, *29*(5), 519–535. doi:10.1108/02651331211260368

Sultan, A., & Saurabh, D. (2013). Achieving Sustainable Development through Value Chain. *International Journal of Managing Value and Supply Chains*, *4*(2), 39–46. doi:10.5121/ijmvsc.2013.4204

Sutton, J. (1991). *Sunk Cost and Market Structure: Price Competition, Advertising, and the Evolution of Concentration*. Cambridge: The MIT Press.

Swaminathan, A. (1995). The Proliferation of Specialist Organizations in the American Wine Industry, 1941-1990. *Administrative Science Quarterly*, *40*(4), 653–680. doi:10.2307/2393757

SwedCham. (2018). *SwedCham of Singapore*. Retrieved August 20, 2020, from Swedish Chamber of Commerce Singapore website: https://www.swedcham.sg/swedcham

Swoboda, B., Elsner, S., & Morschett, D. (2014). Preferences and performance of international strategies in retail sectors: An empirical study. *Long Range Planning*, *47*(6), 319–336. doi:10.1016/j.lrp.2012.05.002

Tabish, S. Z. S., & Jha, K. N. (2012). The impact of anti-corruption strategies on corruption free performance in public construction projects. *Construction Management and Economics*, *30*(1), 21–35. doi:10.1080/01446193.2011.654128

Tack, P., Victor, J., Gemmel, P., & Annemans, L. (2016). 3D-printing techniques in a medical setting: A systematic literature review. *Biomedical Engineering Online*, *15*(1), 115. doi:10.118612938-016-0236-4 PMID:27769304

Taha, H. (2017). Operations Research: An Introduction (10th ed.). New York City: New York City: Pearson.

Talja, S. (1999). Analyzing Qualitative Interview Data: The Discourse Analytic Method. *Library & Information Science Research*, *21*(4), 459–477. doi:10.1016/S0740-8188(99)00024-9

Tatar, N. (2018). *Kırsal alanda kadınların girişimcilik algıları Konya İli Derbent ilçesi örneği* [Unpublished master dissertation]. *S*elçuk Üniversitesi, Konya, Turkey.

Tayalı, H. A. (2016). A Literature Review on Production Scheduling with the Drum-Buffer-Rope Technique. *16th International Symposium for Production Research*, 1085–1090. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2919846

Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research*, *1*(1), 77–100. doi:10.1177/1558689806292430

Teece, D. J. (1980). Economies of scope and the scope of the enterprise. *Journal of Economic Behavior & Organization*, *1*(3), 223–247. doi:10.1016/0167-2681(80)90002-5

Teece, D. J. (1982). Towards an economic theory of the multiproduct firm. *Journal of Economic Behavior & Organization*, *3*(1), 39–63. doi:10.1016/0167-2681(82)90003-8

Teece, D. J. (1993). The dynamics of industrial capitalism: Perspectives on Alfred Chandler's Scale and scope (1990). *Journal of Economic Literature*, *31*, 199–225.

The Economist. (2017a). The multinational company is in trouble. *Economist*. Retrieved from https://www.economist.com/news/leaders/21715660-global-firms-are-surprisingly-vulnerable-attack-multinational-company-trouble

The Economist. (2017b, January 28). Multinationals - The retreat of the global company | Briefing | The Economist. *The Economist*. Retrieved from https://www.economist.com/briefing/2017/01/28/the-retreat-of-the-global-company

Thomas, B. G., & Bollapragada, S. (2010). General Electric uses an integrated framework for product costing, demand forecasting, and capacity planning of new photovoltaic technology products. *Interfaces*, *40*(5), 353–367. doi:10.1287/inte.1100.0518

Thompson, J. D. (1967). *Organizations in Action: Social Science Bases of Administrative Theory*. McGraw-Hill.

Thornton, P. (2014). *The Great Economists: Ten Economists Whose Thinking Changed the Way We Live*. Retrieved from https://www.google.com/books?hl=tr&lr=&id=2oXOAwAAQBAJ&oi=fnd&pg=PT3&dq=The+Great+Economists+phil&ots=oZB5Fz1Tak&sig=fhGlAOQirYY5lYHX1KzlO6LvCUE

Thyagarajan, V., & Khatibi, A. (2004). BPR-A tool for managing the change. *Journal of Human Ecology (Delhi, India)*, *15*(1), 57–61. doi:10.1080/09709274.2004.11905667

Thygesen Poulsen, P., Berggren, S., Dahlberg, E., & Kierkegaard, J. L. (1988). *Den skandinaviska modellen : framgångsrika pionjärföretag*. Svenska Dagbladet.

Tisdell, C. (1987). Tourism, the Environment and Profit. *Economic Analysis and Policy*, *17*(1), 13–30. doi:10.1016/S0313-5926(87)50009-1

Tixier, M. (1996). Cultural adjustments required by expatriate managers working in the Nordic countries. *International Journal of Manpower*, *17*(6–7), 19–42. doi:10.1108/01437729610149312

Tong, T. W., Reuer, J. J., Tyler, B. B., & Zhang, S. (2015). Host country executives' assessments of international joint ventures and divestitures: An experimental approach. *Strategic Management Journal*, *36*(2), 254–275. doi:10.1002mj.2210

Torgler, B., & Piatti, M. (2013). Extraordinary wealth, globalization, and corruption. *Review of Income and Wealth*, *59*(2), 341–359. doi:10.1111/roiw.12027

To, W. M., Martin, E. F. Jr, & Yu, B. T. W. (2015). Effect of management commitment to internal marketing on employee work attitude. *International Journal of Hospitality Management*, *45*(2), 14–21. doi:10.1016/j.ijhm.2014.11.002

Treisman, D. (2000). The causes of corruption: A cross-national study. *Journal of Public Economics*, *76*(3), 399–457. doi:10.1016/S0047-2727(99)00092-4

Trenberth, K. E., Jones, P. D., Ambenje, P., Bojariu, R., Easterling, D., Klein Tank, A., & Zhai, P. (2007). Observations: Surface and Atmospheric Climate Change. In S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, & H. L. Miller (Eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

Trendyol. (2019). *Trendyol*. https://www.netmaaslari.com/2016/09/trendyol-maaslari.html, 2019.

Triendl, R., & Yoon, R. (2001, June). Singapore - From microprocessors to microarrays? *Nature Biotechnology*, *19*(6), 521–522. doi:10.1038/89245 PMID:11385445

Tripsas, M. (1997). Unrevealing process of creative destruction: Complementary assets and incumbent survival in the typesetter industry. *Strategic Management Journal*, *18*(S1), 119–142. doi:10.1002/(SICI)1097-0266(199707)18:1+<119::AID-SMJ921>3.0.CO;2-0

Tukuta, M., & Saruchera, F. (2015). Challenges facing procurement professionals in developing economies: Unlocking value through professional international purchasing. *Journal of Transport and Supply Chain Management*, *9*(1), 1–9. doi:10.4102/jtscm.v9i1.152

Turban, E., Sharda, R., & Delen, D. (2014). Business Intelligence and Analytics: Systems for Decision Support (10th ed.). New York City: Pearson.

Tureac, C. E., & Anca, T. (2008). Types and Forms of Tourism. *Acta Universitatis Danubius: Oeconomica*, *4*, 92–103.

Turner, F. (2009). Burning man at Google: A cultural infrastructure for new media production. *New Media & Society*, *11*(1), 73–94.

Turuk, M. (2018). The importance of digital entrepreneurship in economic development. *7th International Scientific Symposium*.

Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly*, *31*(3), 439–465. doi:10.2307/2392832

Tyagi, R., Kalish, P., Akbay, K., & Munshaw, G. (2004). GE Plastics optimizes the two-echelon global fulfillment network at its high performance polymers division. *Interfaces*, *34*(5), 359–366. doi:10.1287/inte.1040.0088

Tyszka, T., Cie'slik, J., Domurat, A., & Macko, A. (2011). Motivation, self-efficacy, and risk attitudes among entrepreneurs during transition to a market economy. *Journal of Socio-Economics*, *40*(2), 124–131.

Udemba, E. N., Magazzino, C., & Bekun, F. V. (2020). Modelling the nexus between pollutant emission, energy consumption, foreign direct investment, and economic growth: New insights from China. *Environmental Science and Pollution Research International*, *27*(15), 17831–17842. doi:10.100711356-020-08180-x PMID:32162224

Ulusoy, G., Özlü, E., Kılıç, K., Altekin, T., Budak, E., Çatay, B., Karaata, S., Pasin, M., & Varandi, S. (2017). *Sanayide dijitalleşme stratejileri çalıştayı* [Lexical characteristics of Turkish language]. İstanbul Ticaret Üniversitesi Dış Ticaret Enstitüsü.

Un, C. A., Romero-Martínez, A. M., & Montoro-Sánchez, Á. (2009). Determinants of R&D collaboration of service firms. *Service Business*, *3*(4), 373–394. doi:10.100711628-009-0065-7

UNWTO. (2020). *Glossary of Tourism Terms*. Retrieved from https://www.unwto.org/glossary-tourism-terms

Utterback, J. M. (1994). *Mastering the Dynamics of Innovation*. Harvard Business School Press.

Vahlne, J. E., Ivarsson, I., & Alvstam, C. G. (2018). Are multinational enterprises in retreat? *Multinational Business Review*, *26*(2), 94–110. doi:10.1108/MBR-04-2018-0031

Valdaliso, J. M. (2018). Accounting for the resilience of the machine-tool industry in Spain (c. 1960–2015). *Business History*, 1–26. doi:10.1080/00076791.2018.1473380

Valdaliso, J. M., Elola, A., Aranguren, M. J., & López, S. (2011). Social capital, internationalization and absorptive capacity: The electronics and ICT cluster of the Basque Country. *Entrepreneurship and Regional Development*, *23*(9-10), 707–733. doi:10.1080/08985626.2010.505268

Van de Ven, A. (2017). The innovation journey: You can't control it, but you can learn to maneuver it. *Innovation*, *19*(1), 39–42. doi:10.1080/14479338.2016.1256780

van Hardeveld, H., Driessen, P. P. J., de Jong, H., Nefs, M., Schot, P. P., & Wassen, M. J. (2018). How valuing cultural ecosystem services can advance participatory resource management: The case of the Dutch peatlands. *Ecosystem Services*, *34*, 113–125. doi:10.1016/j.ecoser.2018.10.008

Van Neuss, L. (2018). Globalization and deindustrialization in advanced countries. *Structural Change and Economic Dynamics*, *45*, 49–63. doi:10.1016/j.strueco.2018.02.002

Van Witteloostuijn, A., & Boone, C. (2006). A resource-based theory of structure and organizational form. *Academy of Management Review*, *31*(2), 409–426. doi:10.5465/amr.2006.20208688

Vernon, R. (1966). International Investment and International Trade in the Product Cycle. *The Quarterly Journal of Economics*, *80*, 190–207.

Vernon, R. (1979). The Product Cycle Hypothesis in a new International Environment. *Oxford Bulletin of Economics and Statistics, Special Issue*, *41*(4), 255–267.

Veugelers, R., & Cassiman, B. (2004). Foreign subsidiaries as a channel of international technology diffusion: Some direct firm level evidence from Belgium. *European Economic Review*, *48*(2), 455–476. doi:10.1016/S0014-2921(02)00327-6

Vineela, G. S. (2018). Digital entrepreneurship. *IJIRMPS*, *6*(4), 441–448.

Vissak, T. (2010). Nonlinear internationalization: a neglected topic in international business research. In D. Timothy, P. Torben, & T. Laszlo (Ed.), The past, present and future of international business & management (Vol. 23, pp. 559–580). Bingley: Emerald Group Publishing. Doi:10.1108/S1571-5027(2010)00000230029

Vissak, T., & Francioni, B. (2013). Serial nonlinear internationalization in practice: A case study. *International Business Review*, *22*(6), 951–962. doi:10.1016/j.ibusrev.2013.01.010

Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case Research in Operations Management. *International Journal of Operations & Production Management*, *22*(2), 195–219. doi:10.1108/01443570210414329

Vroom, V. H. (1964). *Work and Motivation*. Hoboken, NJ: Wiley.

Walton, J. K. (2018, November 27). Tourism. In *Encyclopædia Britannica.* Retrieved from https://www.britannica.com/topic/tourism

Wang, G. H., Wang, Y., & Zhao, T. (2008). Analysis of interactions among the barriers to energy saving in China. *Energy Policy*, *36*(6), 1879–1889. doi:10.1016/j.enpol.2008.02.006

Wang, M. C., & Wang, C. S. (2018). Tourism, the environment, and energy policies. *Tourism Economics*, *24*(7), 821–838. doi:10.1177/1354816618781458

Wang, R. D., & Shaver, J. M. (2014). Competition-driven repositioning. *Strategic Management Journal*, *35*(11), 1585–1604. doi:10.1002mj.2167

Warfield, J. W. (1974). Developing interconnected matrices in structural modelling. *IEEE Transcript on Systems, Men and Cybernetics*, *4*, 51–81.

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 52. doi:10.1016/j.lrp.2018.12.001

Warren, B. (2020, April 14). *G20 Performance on Climate Change*. Retrieved from https://www.g20-insights.org/policy_briefs/g20-performance-japan-climate-change/

Watts, D. J. (2003). *Six degrees: The science of a connected age*. Norton.

Welch, C. L., & Welch, L. S. (2009). Re-internationalisation: Exploration and conceptualization. *International Business Review*, *18*(6), 567–577. doi:10.1016/j.ibusrev.2009.07.003

Welsch, H. (2008). The welfare costs of corruption. *Applied Economics*, *40*(14), 1839–1849. doi:10.1080/00036840600905225

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. doi:10.1002mj.4250050207

Werner, S., Brouthers, L. E., & Brouthers, K. D. (1996). International risk and perceived environmental uncertainty: The dimensionality and internal consistency of Miller's measure. *Journal of International Business Studies*, *27*(3), 571–587.

Westhead, P., Ucbasaran, D., & Binks, M. (2004). Internationalisation strategies selected by established rural and urban SMEs. *Journal of Small Business and Enterprise Development*, *11*(1), 8–22. doi:10.1108/14626000410519065

Westphal, J. D., & Milton, L. P. (2000). How Experience and Network Ties Affect the Influence of Demographic Minorities on Corporate Boards. *Administrative Science Quarterly*, *45*(2), 366–398. doi:10.2307/2667075

Wibbens, P. D. (2019). Performance persistence in the presence of higher-order resources. *Strategic Management Journal*, *40*(2), 181–202. doi:10.1002mj.2979

Wikipedia. (2019). *Trendyol*. https://tr.wikipedia.org/wiki/Trendyol

Williams, C., & Ecker, B. (2011). R&D subsidiary embedment: A resource dependence perspective. *Critical Perspectives on International Business*, *7*(4), 297–325. doi:10.1108/17422041111180764

Williamson, O. E. (1985). *The economic institutions of capitalism*. The Free Press.

Wilson, E., Nielsen, N., & Buultjens, J. (2009). From lessees to partners: Exploring tourism public–private partnerships within the New South Wales national parks and wildlife service. *Journal of Sustainable Tourism*, *17*(2), 269–285. doi:10.1080/09669580802495774

Winona, A. A., & Nuzula, N. F. (2016). The relationship between foreign portfolio investment and foreign direct investment on economic growth (study at Indonesia Stock Exchange and Bank of Indonesia Period 2006-2014). *Jurnal Administrasi Bisnis*, *39*(2), 44–49.

Winston, W. L., & Albright, S. C. (2019). Practical Management Science (6th ed.). Boston, MA: Cengage.

Winter, G. (2016). *Think One Team: The revolutionary 90-day plan that engages employees, connects silos and transforms organisations* (2nd ed.). Hoboken, NJ: Wiley.

Wintjes, R. (2016). Systems and Modes of ICT Innovation. JRC Science for Policy Report, European Commission.

Witt, M. A. (2019). De-globalization: Theories, predictions, and opportunities for international business research. *Journal of International Business Studies*, 1–25. doi:10.105741267-019-00219-7

Wittmayer, J., & Bartels, K. (2018). Critical and relational approaches to sustainability transitions. In Action Research in Policy Analysis: Critical and relational approaches to sustainability transitions. Oxen: Routledge.

World Bank Group. (2007). *Helping Countries Combat Corruption: The Role of the World Bank*. Retrieved February 9, 2021 from http://www1.worldbank.org/publicsector/anticorrupt/corruptn/cor02.htm

World Bank Group. (2020). *Brief: Combating Corruption*. Retrieved February 7, 2021, from http://www1.worldbank.org/publicsector/anticorrupt/corruptn/cor02.htm

World Bank. (2011). World Development Report 2011: Conflict, Security and Development. Washington, DC: World Bank.

World Tourism Organization and International Transport Forum. (2019). *Transport-related CO2 Emissions of the Tourism Sector – Modelling Results*. Madrid: UNWTO.

Wu, M., Gide, E., & Jewell, R. (2014). The EBS management model: An effective measure of e-commerce satisfaction in SMEs in the service industry from a management perspective. *Electronic Commerce Research*, *14*(1), 71–86. doi:10.100710660-013-9127-y

Wu, S., Li, B., Nie, Q., & Chen, C. (2017). Government expenditure, corruption, and total factor productivity. *Journal of Cleaner Production*, *168*, 279–289. doi:10.1016/j.jclepro.2017.09.043

Wu, S., Matthews, L., & Dagher, G. K. (2007). Need for achievement, business goals, and entrepreneurial persistence. *Management Research News*, *30*(12), 928–941.

Yalçınkaya, M. (2017). Gelişen Türkiye'nin rekabetçi gücü manisa sanayi bölgesi kobi'lerinin sosyo-ekonomik yapısı: Swot analizi. *Manisa Celal Bayar Üniversitesi Sosyal Bilimler Dergisi*, *15*(2), 279–308.

Yazdanifard, R., & Li, M. T. H. (2014). The Review of Alibaba's online business marketing strategies which navigate them to present success. *Global Journal of Management and Business Research: E-Marketing*, *14*(7), 32–40.

Yemeksepeti. (2019). *Yemeksepeti About Us*. https://www.yemeksepeti.com/sss

Yin, R. (2008). Case Study Research: Design and Methods. New York: SAGE.

Yin, X., & Shanley, M. (2008). Industry Determinants of the "Merger versus Alliance" Decision. *Academy of Management Review*, *33*(2), 473–491. doi:10.5465/amr.2008.31193515

Yoffie, D. B., & Kwak, M. (2001). Playing by the rules: How Intel avoids antitrust litigation. *Harvard Business Review*, *79*(6), 119–122. PMID:11408972

You, J. S. (2014). Land reform, inequality, and corruption: A comparative historical study of Korea, Taiwan, and the Philippines. *The Korean Journal of International Studies*, *12*(1), 191–224. doi:10.14731/kjis.2014.06.12.1.191

Yu, G., Pachon, J., Thengvall, B., Chandler, D., & Wilson, A. (2004). Optimizing pilot planning and training for continental airlines. *Interfaces*, *34*(4), 253–264. doi:10.1287/inte.1040.0082

Yu, T., Sengul, M., & Lester, R. H. (2008). Misery Loves Company: The Spread of Negative Impacts Resulting from an Organizational Crisis. *Academy of Management Review*, *33*(2), 452–472. doi:10.5465/amr.2008.31193499

Zajac, E. J., & Westphal, J. D. (1996). Who shall succeed? How CEO/board preferences and power affect the choice of new CEOs. *Academy of Management Journal*, *39*, 64–90.

Zaman, K., Moemen, M. A.-e., & Islam, T. (2017). Dynamic linkages between tourism transportation expenditures, carbon dioxide emission, energy consumption and growth factors: Evidence from the transition economies. *Current Issues in Tourism*, *20*(16), 1720–1735. doi:10.1080/13683500.2015.1135107

Zaman, K., Shahbaz, M., Loganathan, N., & Raza, S. A. (2016). Tourism development, energy consumption and Environmental Kuznets Curve: Trivariate analysis in the panel of developed and developing countries. *Tourism Management*, *54*, 275–283. doi:10.1016/j.tourman.2015.12.001

Zammuto, R., & O'Connor, E. (1992). Gaining advanced manufacturing technologies' benefits: The roles of organization design and culture. *Academy of Management Review*, *17*(4), 701–728. doi:10.5465/amr.1992.4279062

Zekos, G. I. (2004). Ethics versus corruption in globalization. *Journal of Management Development*, *23*(7), 631–647. doi:10.1108/02621710410546641

Zhang, L., & Gao, J. (2016). Exploring the effects of international tourism on China's economic growth, energy consumption and environmental pollution: Evidence from a regional panel analysis. *Renewable & Sustainable Energy Reviews*, *53*, 225–234. doi:10.1016/j.rser.2015.08.040

Zhang, S., & Liu, X. Y. (2019). The roles of international tourism and renewable energy in environment: New evidence from Asian countries. *Renewable Energy*, *139*, 385–394. doi:10.1016/j.renene.2019.02.046

Zhang, S., Zhao, S., Bournakis, I., Pearce, R., & Papanastassiou, M. (2018). Subsidiary roles as determinants of subsidiary technology sourcing: Empirical evidence from China. *Economics and Politics*, 1–26.

Zhao, F., & Collier, A. (2016). Digital entrepreneurship: research and practice. *9th Annual Conference of the EuroMed Academy of Business*.

Zhao, J. H., Kim, S. H., & Du, J. (2003). The impact of corruption and transparency on foreign direct investment: An empirical analysis. *MIR. Management International Review*, *43*(1), 41–62.

Zhu, H., & Chung, C. N. (2014). Portfolios of political ties and business group strategy in emerging economies: Evidence from Taiwan. *Administrative Science Quarterly*, *59*(4), 599–638. doi:10.1177/0001839214545277

Zolfagharian, M., Walrave, B., Raven, R., Georges, A., & Romme, L. (2019). Studying transitions: Past, present, and future. *Research Policy*, *48*(9), 103788. doi:10.1016/j.respol.2019.04.012

Zouaghi, F., Sánchez, M., & García Martínez, M. (2018). Did the global financial crisis impact firms' innovation performance? The role of internal and external knowledge capabilities in high and low tech industries. *Technological Forecasting and Social Change*, *132*, 92–104. doi:10.1016/j.techfore.2018.01.011

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