Handbook of Research on

Innovative Management Using AI in Industry 5.0

Vikas Garg and Richa Goel

IGI Global
PUBLISHER of TIMELY KNOWLEDGE

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List of Contributors

Table of Contents

Detailed Table of Contents

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Artificial intelligence's ability to enhance the applicant and employee involvement by automating routine, low-value responsibilities, and freeing up time to concentrate on the more planned, innovative work that teams need and want to do has been a burning topic in the research world for years. The technology may lead to improved recruitment, performance evaluations, training, and career management approaches. This literature review looks at artificial intelligence in HRM in terms of recruitment, performance measurement, training and coaching, and career management operations. It allows HR departments to enhance the applicant and employee experience by automating low-value, routine activities, allowing resources to concentrate on more strategic, disruptive work.

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The purpose of the study is to understand the phenomenon of using artificial intelligence (AI) in human resources, especially in the gulf countries. This research effort provides a future perspective of using AI to better understand HR practitioners' attitudes and perspectives within multiple frameworks and the implications that technological advancements, in particular AI, have for the recruitment process. The study reveals that gulf countries will implement a vision (2030 vision) that will have a great opportunity to keep up with the digital transformation. It aims to investigate where AI can be implemented in the traditional recruitment process and possibly make the process more effective, as well as about what the implications would be of having AI within recruitment which leads to change in the composition of the workforce within organizations. It is urged that modern AI applications are an essential approach for organizations that work in an inconsistent environments.

Financial inclusion refers to making financial services available at the doorsteps of the citizens of India. There has been a lot of research to identify the various factors that lead to the adoption of technology for banking and availing of financial services. But there is no study on the factors that impact the adoption of technology and formal banking services in India. A large section of the population in India still uses the informal banking channel such as money lender, relatives which leads to difficulties in availing the financial services. Qualitative research and that grounded theory have been used for research. Direct interview has been used to collect data from the participants across 11 different villages. The study highlights that the level of financial and digital literacy has improved in India though the Kisan credit card scheme faces various problems in implementation.

There will be a revolution in industry and society as a result of Industry 5.0. Human-robot co-working, also known as cobots, is a key component of Industry 5.0. Industry 5.0 will overcome all the limitations of the previous industrial revolution. Humans and machines will work together in this revolution to increase the efficiency of processes by utilising human brainpower and creativity. To solve complex problems more efficiently and with less human intervention, Industry 5.0 provides a strong foundation for advanced digital manufacturing systems through interconnected networks, and it's designed to communicate with other systems, as well as powerful computing power. To enhance customer satisfaction, Industry 5.0 involves a shift from mass customization to mass personalization along with a shift from digital usage of data to intelligent use of data for sustainable development. On the basis of comparative analysis, this chapter outlines Industry 5.0's definition, its elements and components, and its application and future scope paradigm.

AI has begun making its presence felt in every industry and now across the financial services industry as well. This chapter examines and presents the use of AI in banks for better customer service giving them a personalized experience. This chapter explains how banks are getting future-ready for their financial services by means of AI and are delivering financial offerings seamlessly. This research primarily focuses on the concept of AI in the field of banking, how AI has revolutionized personalized banking and made banking operations more efficient and successful. AI innovations are an integral part of Industry 5.0 which aims at integrating automation and human intelligence. This chapter aims to study and describe the current applications of AI in the banking industry and its impact on the banking sector. The study also gives a description of the banks employing AI to facilitate an exceedingly personalized customer

journey with the banks.

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Transformation is being observed in almost every sphere of life. Industries accept technological advancements by accepting artificial intelligence and automation to improve the quality of products and services and to have errorless processes. The industry has a large number of human resources, and it functions on the concept of human touch, also known as the essence of hospitality; however, with the advent of artificial intelligence, fear of losing the human resources and human touch in the industry is paramount. The authors of the chapter detail the significance of the human touch in the tourism and hospitality industry. The chapter also highlights the usage of artificial intelligence in tourism through predictive analysis, travel experiences through virtual assistance, and the digital transformation tourism and hospitality have observed mainly in the coronavirus pandemic. It ends with a discussion on artificial intelligence in tourism and hospitality as support system for human resources or enhanced service quality and customer experience.

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With Industry 4.0 and now 5.0 technologies, the entire globe is embracing these changes. Artificial intelligence-powered systems have immense potential to eliminate international geographical barriers and prove to influence global trade worldwide. The present study highlights how AI increases productivity, economic development, and provides international trade with new horizons. The global value chains, prediction of future trends like changes in consumer demand, risk management, supply chain links are some of the key applications of AI in the sector. AI empowers international trade negotiations to analyze economic trajectories of negotiating partners, adjustments of trade barriers at different rates and scenarios. The chapter will cover the support of AI to access global trade data, its response to diverse challenges, international expansions through digital platforms, support in translations, mechanism of demand prediction, automation of administration with increased efficiency and utility, smart manufacturing, barriers, and influences.

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The industrial revolution and advancement in field of artificial intelligence in term of Industry 4.0 has reduced the need of human intervention at workplace. That is why murmur has started around Industry

5.0 where the focus is collaborative interaction between human and machines/robots for sustainable development of industries. The objective of this study is to assess the effects on the well-being of the employees in the dynamic setting through spirituality training. The study includes the detailed analysis of 392 responses collected from employees working in high-tech and high-automated organisations such as automobiles, FMCG, and IT with the help of structured questionnaire. This study might help improve the employee wellbeing and reduce the uncertainty in workforce participation and provide more creative, innovative, and engaging mindset in Industry 5.0. The research results have presented a significant interaction between the employee wellbeing, outlook, and self-determination at workplace in the presence of spirituality training.

This study offers a methodology to evaluate HR analytics application critical factors that can aid HR managers in making proper strategic decisions. To help advance the study on the implementation of HR analytics, this research is based on the grey DEMATEL approach to envisage the formation of complex interrelation between the CSFs and find the effect level of these factors. Drawing conclusion from the above, the present study addresses certain key issues. Firstly, it aims to examine the challenges in implementing HR analytics techniques in Indian industry. Secondly it examines the causal relationship to analyses the tasks and their effect in detail. After analysing the available literature and creating the research problem based on the gaps observed, the chapter accentuates the necessity for studying and analysing the HR analytics challenges in Indian industries.

Artificial intelligence (AI) has grown by leaps and bounds in the past few years making it a necessary tool for organizations all over the world to pave the road to a smart future by entering into its various functions and making it more efficient. However, companies in India have been hesitant and slow to adapt this technology, and this hesitation is ever so clearly seen in the human resources function of the organization. The primary purpose of this chapter is to explore the application, benefits and challenges of integration, and the limitations of AI in HRM within the Indian context. The study is relevant and beneficial to organisations that seek to enhance the effectiveness and efficiency of their HRM functions by leveraging the power of AI.

The process of producing and selling items, from the beginning of delivering raw materials till their end of production and sale for consumers, is referred to as a supply chain. In the present era, supply chain management has also transformed according to the requirement and changing complexities. It is a netting of businesses that work together so that things like logistics, stock management, transport, etc. go as smoothly as they can, including suppliers, manufacturers, carriers, distributors, and retailers. Companies have been trying to develop ways of enhancing flexibility and reaction and competitiveness by changes in their operational strategies, processes, and technology.

With the population growth and the employability scarcity, the placement of students has become a significant concern. Problems of global ageing and miss-match of student skill and knowledge can be witnessed easily. Fewer works of literature are available to predict the placement of students. This study aims to create a supervised machine learning (SML) model to predict the employability of graduates based on their academic scores and streams. The study used the decision-tree technique to create the SML model. The model can predict the placement chance based on students' academic scores and streams with 65% accuracy. Some new theoretical and practical contributions have been discussed.

The purpose of the chapter is to structure and synthesize the research findings in Gaming AI till date by reviewing the research articles published in high citation, indexed, and peer reviewed journals. Eighteen articles were extracted through systematic process of search and exclusion and inclusion criteria adopted for the study. The selected papers were categorized according to the simulation for AI and AI-based simulation model, and AI applications from literature was reviewed, and conclusions were drawn. Research in Gaming AI is fragmented and unrelated as regards geographical, methodological, and disciplinary aspects. Gaming AI is an emerging research area which is gaining interest in recent years though very little quantitative or qualitative research has been undertaken till date. Recommendations on future research directions were made.

Amidst the COVID-19 pandemic situation, the human race has entered the era of hope and transformation,

and there is growing pressure and focus to raise awareness to adopt alternative interventions and sustainable practices to ensure gaining sound functioning of physiological organs. Can yoga and meditation promote clarity in thoughts and enhance alertness at work? Does practice of mudras help in improving concentration level of individuals? Do yoga and meditation help to improve the improve quality of life in general? The aim of this chapter is to help new practitioners, scholars, and employees to understand fitness mantra without stress and strain through Indian style of yoga and meditation. This chapter presents an overview of collection of research papers and articles written by yoga experts, saints, and researchers that have emphasized psychology, spirituality, and mentioned evidence for better mental health or effectiveness of yoga, meditation, and mudra interventions as tools for improving the overall personality and mental health of individuals.

Artificial intelligence is a branch of science and technology that has been used effectively over the decades in various fields, and now it has become an indispensable part of organizational practices as it is one of the leading technologies in the current era, and now there is an emerging trend of applying AI technologies within the businesses. The central necessity of human resource management is also majorly based on technological approaches as it became a potential need for any human resources department to perform its role in the development of the whole organization. Technologies based on AI are and will be the smart system of the future and it's also changing the processes of human resource management by making it more dependent on advanced technologies. Through the chapter, the researcher will get to know the artificial technologies being practiced in HR practices and explore the probable and potential of technicality of AI in HRM and also the challenges associated with AI in HRM and its future possibilities.

Artificial intelligence is already here in all facets of work life. Its integration into human resources is a necessary process which has far-reaching benefits. It may have its challenges, but to survive in the current Industry 4.0 environment and prepare for the future Industry 5.0, organisations must penetrate AI into their HR systems. AI can benefit all the functions of HR, starting right from talent acquisition to onboarding and till off-boarding. The importance further increases, keeping in mind the needs and career aspirations of Generation Y and Z entering the workforce. Though employees have apprehensions of privacy and loss of jobs if implemented effectively, AI is the present and future. AI will not make people lose jobs; instead, it would require the HR people to upgrade their skills and spend their time in more strategic roles. In the end, it is the HR who will make the final decisions from the information that they get from the AI tools. A proper mix of human decision-making skills and AI would give organisations the right direction to move forward.

Chapter 17

Artificial intelligence (AI) is a huge headway in innovation that has everybody talking about its energizing guarantees in the innovation world. With regards to AI, it additionally incorporates its territories, for example, AI (ML). While AI could be portrayed as the capacity of machines to settle on shrewd human-like choices and improve over the long run, ML includes building models, generally statistical models that give prescient outcomes and can be developed. Many are not extremely educated about this area. While this is true, there is something else entirely to it from face recognition, fingerprints recognition, chat-bots, predictive business models, and sentimental analysis. Beforehand, AI joining in the product advancement was simply conceivable to the huge organizations that had the assets to recruit exceptionally qualified experts. Over the long run, AI structures with high deliberation levels have been created, and with few coding lines in any programming language of the decision, one can have the option to enter in various fields.

Chapter 18

The chapter deals with the relationship between human leader and artificial leader. Organizations are encroached by artificial intelligent in almost all the areas of the organization such as retail industry, banking industry, call centers, manufacturing industry. The chapter shows the path how human leader sharing workplace space with the artificial leaders and make them as their workplace spouses for the better functioning of the organizations and the economy. The limitation of the research is implementation of AI in organizations will generate social problems such as unemployment, theft, etc. The future scope of the research is to analyze the working of artificial leaders in the academic industry.

Chapter 19

Man-made reasoning's (AI) coordination into HR practices will improve associations in light of the fact that these applications can dissect, anticipate, and analyze to help HR groups settle on better choices. Computer-based intelligence can be inserted in capacities like enlistment, preparing, onboarding, execution investigation, maintenance, and so forth. A large part of associations are as yet slacking in coordinating AI to their HR practices due to cost. Man-made intelligence execution ought to be seen as an idealistic chance, since AI improves lives. Computer-based intelligence makes a superior future in case it is plainly perceived and used in an appropriate manner. Hence, this chapter gives a description about artificial intelligence and its history, its importance in every arena of the society, and the use of AI in human resources management.

Chapter 20

In 2020, the whole world experienced a pandemic that rose in different parts of the world leading to a pandemic; many businesses were affected because of it, and it changed people's thinking towards life. It also changed how consumers looked at purchasing products online. This study focuses mainly on how the new age technologies like machine learning, internet of things, and artificial intelligence helps in identifying the consumer buying patterns. Consumer buying pattern on online shopping have changed over a period during this pandemic. This research highlights the role of these technologies in marketing and how it has helped the companies to create their marketing strategies. This research also includes the study of change in buying patterns of consumers during the pandemic and how it has increased over a period of time through primary research done with 30 respondents taken as a focus group.

The first thing in our minds when we talk about tourism and travel is how convenient the technologies have all made it for us. Artificial intelligence in the travel business is already developing enormous importance. The advanced applications of AI and robotics will certainly provide a rich experience to the customers of the traveling industry. Some of the well-known applications including language translators, chat-bots, virtual reality, and many more are certainly showing a huge impact and their effectiveness when applied in the travel and tourism industry. The study mainly aims to define the tourism sector in India and its impact on the tourist industry by emerging technologies, such as artificial intelligence. It will also define how tours and travel are safer and more secure in the future.

Foreword

Due to increasing globalization and technical advances, especially in the field of information technologies, the corporate environment has altered drastically in the last decades. The corporate climate has grown more competitive and dynamic. Business models also have changed at an important pace to deal with this environment and companies rely on innovation for their existence today more than ever. The only way to thrive is to continually develop new goods and services that may provide value both to consumers and to companies in today's fast-changing business climate encouraged by Industry 5.0 and IoT.

No industry remains in which AI is not employed. The use of this technology has already covered fields such as law, political science, politics, and economics; war, self-subsistence, education, and space exploration, amongst others, will soon be permeated. Giants of technologies like Google, Apple, and Facebook devote their money, effort, and time to artificial intelligence integration already. These corporations also took steps to promote the evangelization of the AI masses. Therefore, knowing the applications of AI is vital to anyone.

This book offers an insight into the important components of Artificial Intelligence in Industry 5.0. By offering a thorough and strong introduction to artificial intelligence in the guise of an obvious, brief book, the authors bring this intriguing topic to life. It explores education driven by AI, entertainment and AI, home and service robots, re-imagined medical care, predictive policing, spatial AI exploration, AI weapons, and many more key applications. Aiming at understanding the fundamentals of artificial intelligence.

I assume that academicians, students, corporates, masses in all fields can improve and expand their knowledge with the learning of the basic trends and activities in this book. This book offers a valuable guide to the intellectual and practical work and calls for the need to rethink and examines the consequences for future management of innovation.

I am pleased to write this foreword as the Editors of this Book have given full-hearted effort for a great solution and innovation. All chapters in this book have been selected based on peer review where reviewers were very much experts in the sector.

Vijay Garg
Dainik Bhaskar Group, India

Preface

There is no industry left where artificial intelligence is not used in some capacity. The application of this technology has already stretched across a multitude of domains including law and policy; it will soon permeate areas beyond anyone's imagination. Technology giants such as Google, Apple, and Facebook are already investing their money, effort, and time toward integrating artificial intelligence. As this technology continues to develop and expand, everyone must understand the various applications of artificial intelligence and its full potential.

The *Handbook of Research on Innovative Management Using AI in Industry 5.0* uncovers new and innovative features of artificial intelligence and how it can help in raising economic efficiency at both micro and macro levels and provides a deeper understanding of the relevant aspects of artificial intelligence impacting efficacy for better output. Covering topics such as consumer behaviour, information technology, and personalized banking, it is an ideal resource for researchers, academicians, policymakers, business professionals, companies, and students. Numerous practical aspects of artificial intelligence that enhance industry skills, as well as decision-making, are gaining momentum. AI-enabling technology's exponential expansion increases support for the improvement of service for industry 5.0. Meanwhile, practical issues of artificial intelligence play an important role in developing cognitive tools and analytics in many industry-wide developments and real-time applications.

However, little has been done in corporate and political communities to produce a comprehensive study to enhance the general atmosphere for innovation and to facilitate the concept's capacity for implementation. Innovation is a growing and dynamic theme, and this book is particularly designed to explore innovation management throughout the AI and 5.0 era. AI and machine learning can appear quite exhausting and should be employed by companies for innovation. This book is a solid step forward. The theme of the book is very much inter-disciplinary. Although focused on the Stakeholder Strategies, the book will be of great use for the people in Corporate, Sociology, Social Work, Political Science, Public Administration, Mass Media, and Communication, Information system, Development Studies as well to business studies. The models discussed in the book will have a huge replication and practice potential across the world and the field is one of the most important growing fields across the globe. This book will find a place as a Text for bachelor and master in Level courses in Corporate Governance, Sociology, Social Work, Disaster Management, Political Science, Public Administration, Mass Media and Communication, Information systems, Development Studies, Management Studies, Crisis Management, etc. On the other hand, this book will serve as an excellent reference source to the practitioners working in the field of stakeholders and their strategies.

Secondly, this book is laid out in a reader-friendly format where important information duly analyzed is highlighted thus facilitating an easy understanding of the content. The book provides resources to the readers thus providing an opportunity for further detailed studies. The case studies will provide a

tried and tested approach to the resolution of typical problems in the area of study. The key concepts and summarized content of the chapters will enable the reader to absorb the contents at glance. Many academic areas are reflected in this book which includes

- Consumer Behaviour
- Financial Accounting
- Human Resources
- Information Technology
- New Age Technologies
- Personalized Banking
- Student Employability
- Supply Chain Management
- Tourism Industry
- Trade and Commerce

This handbook of Research on Innovative Management Using AI in Industry 5.0 is a comprehensive assimilation of contemporary development in the current scenario of industry 5.0. It includes the following chapters:

Chapter 1 talks about artificial Intelligence in human resource management and its ability to enhance the applicant and employee involvement by automating routine, low-value responsibilities, and freeing up time to concentrate on the more planned, innovative work that teams need and want to do has been a burning topic in the research world for years. The technology may lead to improved recruitment, performance evaluations, training, and career management approaches.

Chapter 2 talks about the adaption of artificial intelligence in human resource management by organizations in gulf countries. It provides a future perspective of using AI to better understand HR practitioners' attitudes and perspectives within multiple frameworks and the implications that technological advancements, in particular AI, have for the recruitment process. It is urged that modern AI applications are an essential approach for organizations that work in an inconsistent environment.

Chapter 3 talks about the Evaluation of Financial Inclusion in villages of India and on the factors that impact the adoption of technology and Formal banking services in India. A large section of the population in India still uses the Informal Banking channel such as Money Lender, Relatives which leads to difficulties in availing the financial services. It also highlights that level of Financial and Digital literacy has improved in India and though the Kisan Credit Card scheme faces various problems in implementation.

Chapter 4 talks about Industry 5.0 as a macro perspective approach by solving complex problems more efficiently and with less human intervention. Industry 5.0 provides a strong foundation for advanced digital manufacturing systems through interconnected networks, and it's designed to communicate with other systems, as well as powerful computing power. To enhance customer satisfaction, Industry 5.0 involves a shift from mass customization to mass personalization along with a shift from digital usage of data to intelligent use of data for sustainable development.

Chapter 5 talks about artificial intelligence and personalized banking where AI has begun making its presence felt in every industry and now across the financial services industry as well and proliferate amid much propaganda about the technology. It examines and presents the use of AI in banks for better customer service giving them a personalized experience and also explains how banks are getting future-ready for their financial services through AI and are delivering financial offerings seamlessly thus

focuses on the concept of AI in the field of banking, how AI has revolutionized personalized banking and made banking operations more efficient and successful.

Chapter 6 talks about artificial intelligence and automation transforming the hospitality industry or threat to human touch. The industry has many human resources, and it functions on the concept of human touch, also known as the essence of hospitality; however, with the advent of artificial intelligence, fear of losing the human resources and human touch in the industry is paramount. It details the significance of the human touch in the tourism and hospitality industry and also highlights the usage of artificial intelligence in tourism through predictive analysis, travel experiences through virtual assistance, and the digital transformation tourism and hospitality have observed mainly in the coronavirus pandemic. It ends with a discussion on artificial intelligence in tourism and hospitality as a support system for human resources or enhanced service quality and customer experience.

Chapter 7 talks about artificial intelligence as an emerging technology in global trade. With Industry 4.0 and now 5.0 technologies, the entire globe is embracing to acknowledge these changes. Artificial Intelligence-powered systems have immense potential to eliminate international geographical barriers and prove to influence global trade worldwide. It highlights how AI increases productivity, economic development and provides International Trade new horizons. The global value chains, prediction of future trends like changes in consumer demand, risk management, supply chain links are some of the key applications of AI in the sector. AI empowers International Trade negotiations to analyze the economic trajectories of negotiating partners, adjustments of trade barriers at different rates and scenarios.

Chapter 8 talks about the intellectual impact of spiritual well-being, self-determination, and employee outlook on Industry 5.0. The industrial revolution and advancement in the field of Artificial Intelligence in terms of Industry 4.0 have reduced the need for human intervention at the workplace. That is why; murmur has started around Industry 5.0 where the focus is collaborative interaction between humans and machines/robots for sustainable development of industries. The objective of this study is to assess the effects on the well-being of the employees in the dynamic setting through spirituality training.

Chapter 9 talks about a model for evaluating hr analytics critical success factors in Industry 5.0. It offers a methodology to evaluate HR Analytics application critical factors that can aid HR managers to make proper strategic decisions. To help advance study on the implementation of HR analytics, this research is based on the grey DEMATEL approach to envisage the formation of complex interrelation between the CSFs and find the effect level of these factors. Drawing conclusion from the above the present study addresses certain key issues.

Chapter 10 talks about managing human resource in Artificial intelligence Era 5.0 where AI has grown by leaps and bounds in the past few years making it a necessary tool for organizations all over the world to pave the road to a smart future by entering its various functions and making it more efficient. However, companies in India have been hesitant and slow to adapt to this technology and this hesitation is ever so clearly seen in the Human Resources function of the organization. The Primary purpose of this article is to explore the application, benefits, and challenges of integration, and the limitations of AI in HRM within the Indian context.

Chapter 11 talks about information technology in supply chain management as SCM also transformed according to the requirement and changing complexities of the It is a netting of businesses that work together so that things like logistics, stock management, transport, etc. go as smoothly as they can, including suppliers, manufacturers, carriers, distributors, and retailers. Companies have been trying to develop ways of enhancing flexibility and reaction and competitiveness by changes in their operational strategies, processes, and technology.

xxii

Chapter 12 talks about modelling student employability on an academic basis as with the population growth and the employability scarcity, the placement of students has become a significant concern. Problems of global aging and miss-match of student's skill & knowledge can be witnessed easily. Fewer works of literature are available to predict the placement of students. This study aims to create a 'Supervised Machine Learning (SML)' model to predict the employability of graduates based on their academics scores & streams.

Chapter 13 talks about narrative review of game AI 2000 onwards and future research directions as research in Gaming AI is fragmented and unrelated as regards geographical, methodological, and disciplinary aspects. Gaming AI is an emerging research area which is gaining interest in recent years though very little quantitative or qualitative research has been undertaken till date. Recommendations on Future research directions were made.

Chapter 14 talks about employee wellness without stress and strain through the application of yoga and meditation in management with Industry 5.0 perspective. It presents an overview of the collection of research papers and articles written by yoga experts, saints, and researchers which have emphasized psychology, spirituality and mentioned evidence for better mental health or effectiveness of yoga, meditation, and Mudra interventions as a tool for improving overall personality and mental health of individuals.

Chapter 15 talks about artificial intelligence in human resource practices with challenges and future as technologies based on AI are and will be the smart system of the future and it's also changing the processes of human resource management by making it more dependent on advanced technologies.

Chapter 16 talks about artificial intelligence inroads into HR from present to future. A proper mix of human decision-making skills and AI would give organizations the right direction to move forward.

Chapter 17 talks about use of artificial intelligence in financial accounting. Over the long run, AI structures with high deliberation levels have been created, and with few coding lines in any programming language of the decision, one can have the option to enter various fields.

Chapter 18 talks about humans leaders and artificial intelligent leaders and shows us the path of how human leaders sharing workspace with the artificial leaders and make them their workplace spouses for the better functioning of the organizations and the economy.

Chapter 19 talks about managing human resources in artificial intelligence era which will improve associations because these applications can dissect, anticipate, and analyze to help HR groups settle on better choices. Computer-based intelligence can be inserted in capacities like enlistment, preparing, onboarding, execution investigation, maintenance, and so forth Notwithstanding, they added, a larger part of associations is yet slacking in coordinating AI to its HR rehearses due to cost. "Man-made intelligence execution ought to be an idealistic chance since AI improves lives.

Chapter 20 talks about how new-age technologies are used to identify consumer behavior and its change during and after pandemic and highlights the role of these technologies in marketing and how has it helped the companies to create their marketing strategies. This research also includes the study of changes in buying patterns of consumers during the pandemic and how has it increased over a period.

Chapter 21 talks about the role of artificial intelligence and its impact on the tourism industry of India as the advanced applications of AI and Robotics will certainly provide a rich experience to the customers of the traveling industry. Some of the well-known applications are language translators, chat-bots, virtual reality, and many more are certainly showing a huge impact and their effectiveness when applied in the travel and tourism industry.

Thus, this book intends to give a quality publication with unique insights and methods of application for current scholars and users. This book offers a great overview of how Artificial Intelligence (AI) transforms organizations and organizes innovation management. AI may push management to reconsider the whole innovation process of one firm in line with rapid technology growth and the replacement of human organizations. In response, this book examines the consequences for future management of innovation. The AI problems are both challenging and intriguing. They are being engaged in developing new analytic approaches and providing new solutions that address the constantly shifting dangers with zeal, persistence, and devotion. Digital revolutions in companies should be considered in this new age of industry 5.0, worldwide interconnection and interdependence by enticing innovations utilizing AI New Age technology.

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First and foremost, we would like to thank our Almighty God. In the process of putting this book together, we realized how true this gift of writing is. You gave us the power to believe in our passion and pursue our dreams. We could never have done this without faith in you.

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We owe an enormous debt of gratitude to those who gave us detailed and constructive comments on few chapters and pushed us to clarify concepts, explore, particular facets of insight work and explain the rationales for specific recommendations. We also like to thank many people who have helped us learn and practice both the art and science of networking throughout the years.

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Chapter 1
Artificial Intelligence in HRM

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ABSTRACT

Artificial intelligence's ability to enhance the applicant and employee involvement by automating routine, low-value responsibilities, and freeing up time to concentrate on the more planned, innovative work that teams need and want to do has been a burning topic in the research world for years. The technology may lead to improved recruitment, performance evaluations, training, and career management approaches. This literature review looks at artificial intelligence in HRM in terms of recruitment, performance measurement, training and coaching, and career management operations. It allows HR departments to enhance the applicant and employee experience by automating low-value, routine activities, allowing resources to concentrate on more strategic, disruptive work.

INTRODUCTION

Today, human resource is the department that decides an organization's employee profile, oversees recruiting procedures, ensures chosen applicants' adaptability to the company, monitors employee satisfaction, and is ultimately responsible for the personnel's performance and productivity. The HR department, which is the most isolated division of the business world, has begun to embrace digitalization (Rana, 2018). Recruitment, performance assessments, preparation and orientation procedures, job management, and coaching are all handled much more effectively with artificial intelligence than with conventional approaches, both financially and in terms of time. Although artificial intelligence was once believed to be a science fabrication concept, most specialists today recognize that smart technology implementation is dynamically transforming workplaces. According to Madakam et al., (2019) artificial intelligence (AI) has applications in almost every discipline and sector, including human resources. AI,

conferring to human resources professionals, provides opportunities for learning new skills and freeing up time, allowing HR specialists to broaden their current positions and become more strategic within their organizations. HR experts are finding it difficult to keep up with the rapid speed of technological change in the workplace. As a result, it's more important than ever for HR professionals to consider how AI is reshaping the industry.

At its most basic level, AI is an expertise that enables computers to learn from and suggest activities based on formerly collected data. Artificial intelligence is used in a variety of ways in human resource management to streamline processes and increase productivity. Humans analyze the data in front of them and draw conclusions based on their knowledge. People make machines appear smart by feeding them the right data and technology. Although companies are integrating AI into their human resource systems at changing rates, it is clear that as the technology becomes more widely embraced, it has a long-term effect on the field (Bostrom, 2017). As a result, HR managers must get ready for these developments by learning about technology and how it's used in different functions. Recruitment and onboarding, employee involvement, process management, and the automation of organizational tasks are only a few of the many implementations of AI in the human resources field that HR practitioners can expect to see. While several companies have begun to incorporate AI technology into their recruitment activities, the enormous majority have yet to do so. Therefore, practitioners have a lot of room to change their processes and enjoy the advantages of using this cutting-edge technology. AI is used to the advantage of both the recruiting company and the job seekers during the hiring process. For example, AI technology help streamline application processes by creating more user-friendly forms that job applicants are more likely to complete, lowering the number of applications that are abandoned.

HR experts use artificial intelligence to increase organizational agility and employee engagement, in addition to improving the recruiting process. HR departments gauge employee retention and work gratification more reliably than before using customized feedback reviews and employee acknowledgment systems. This is useful given how important it is to comprehend employees' general needs, but there are also many main organizational benefits to getting this knowledge. Some AI software assesses key measures of employee performance to determine those who should be promoted, resulting in increased internal mobility (Yu et al., 2018). This can lower talent acquisition costs while also increasing employee satisfaction. However, this technology isn't just for detecting internal advancement opportunities; it also predicts who on a team is most likely to leave. Knowing this information as soon as possible helps HR practitioners to deploy retention efforts until it's too late, reducing employee turnover strategically.

One of the most significant advantages of using artificial intelligence in human resources systems is the same as it is in other fields and industries: HR professionals have more time to contribute to corporate strategic planning by automating low-value, easily repeatable administrative activities according to Zehir et al., (2019). As a result, the HR department becomes a strategic business partner for their companies. Smart technology automates tasks like administration, applicant pre-screening, interview scheduling, and more. Each of these roles is critical to an organization's overall success, completing the tasks involved in such processes takes time, and the responsibility of these responsibilities also means HR professionals have less time to devote to serving their employees in more meaningful ways.

Although it is clear that AI continues to have a positive impact on human resources management in the coming years, HR professionals are mindful of the challenges they face. The most common issues among HR executives revolve around making AI easier and safer to use. In reality, security and privacy issues are the most common reason why people are hesitant to use AI at work. Staying on top of trends and technologies as they grow and adapt is essential for HR practitioners to resolve concerns. In the

field of human resources, AI is used to produce sensitive insights using sensitive data. Crawshaw et al., (2020) suggested that by using this technology, people are conscious of ethical and privacy concerns. Employees, for example, expect their employers to respect their data and seek their consent before using technology to collect information about them. Organizations, on the other hand, want to feel safe from data breaches, so HR practitioners consider the necessary security measures. Professionals take the required steps to learn about emerging developments in the industry and lay a solid base of HR expertise that they draw as the profession grows and prepares for the future of human resources management.

This literature review discusses artificial intelligence in human resource management in recruitment, performance evaluation, training, and coaching, as well as career management operations. Artificial Intelligence allows HR departments to enhance the applicant and employee experience by automating routine, low-value activities and freeing up resources to concentrate on the more strategic, innovative work that HR teams need. The study advances artificial intelligence research further by helping HR managers discover more about the digitization of HRM and by enabling them to embrace technology effectively in organizations. In an organization where technology is considered a risk, it is essential to undertake studies that will help further the knowledge on how to have successful automation of the human resource department through artificial intelligence.

ARTIFICIAL INTELLIGENCE REIMAGING HUMAN RESOURCES

The incorporation of artificial intelligence (AI) into human resources (HR) activities would improve organizations because these systems evaluate, forecast, and diagnose to assist HR teams in making informed decisions. Recruitment, preparation, onboarding, performance measurement, and retention will all benefit from AI as seen in Yorks et al. research study (2020). The majority of companies are lagging because of the high cost of incorporating AI into HR activities. AI improves lives. Yorks et al. theorized that its introduction is seen as a positive opportunity (316). If AI is well understood and applied, it results in a better future.

According to DeCenzo & Robbins, (n.d.) HR is all about establishing personal connections between businesses and current and prospective employees. The HR departments would need to use scalable AI technologies to do this on a wide scale. For example, in the past, businesses needed new hires to reenter the same details several times during the new-hire process. They made a bad impression because of this boring, repetitive mission. Companies are using artificial intelligence (AI) to help applicants move information from their resumes onto smart digital forms and complete their applications more quickly (Mohanty & Vyas, 2018). This data is sent automatically through background checks and new hire forms. AI identifies relevant information from a candidate's resume, archive it, and automatically enters it into future forms so they don't have to keep repeating themselves. Businesses have invested in AI to help them assess an applicant's past job experience and preferences and align them with open positions that are ideally fit for them while they make the candidate experience a priority for their recruitment operations (Lima et al., 2021). It was found that companies are now using AI to screen applicants before they speak with a recruiter on the phone.

Gope et al., (2018) also suggested that AI is also helping HR teams better understand employee referrals by analyzing the types of candidates that employees are raising and determining who endorses the most active candidates. AI looks at past referrals' performance data and identifies when applicants who are close to active workers are being recommended. By automating routine, low-value tasks and freeing

up resources to concentrate on the more strategic, innovative work that HR teams need and want to complete, AI helps HR departments to enhance the applicant and employee experience (Robert et al., 2020). Instead of spending time monitoring each phase of the onboarding process for new employees, those steps can be intelligently automated allowing teams to devote more time to more critical activities like mentoring and input collection (Gope et al., 2018). For example, all the data collected during application and employee lifecycles yield a lot of useful information to boost employee engagement and retention.

It is important to consider that artificial intelligence provides HR experts with data-backed tools and clear employee insights. Tripathi et al., (2021) found out that this encourages HR practitioners to take action to have the employee experience that the workforce needs and demands, resulting in improved engagement and reduced turnover. They had every leader paying attention to staff and acting on their suggestions (Tripathi et al., 2021). Artificial intelligence is one of the ways that HR can communicate and consider the needs of a large number of employees.

Employee engagement is a science, and measuring and assessing employee opinion daily is an important part of the science. It was found that workers and HR professionals use AI-powered chatbots to continue the engagement conversation during the year (Cheng & Jiang, 2020). Chatbots provide users with a normal, human-like, and always-on communication mechanism that engages them in personalized conversations. Following that, the exchanges are evaluated and used to resolve the employee's basic interests, desires, and needs (Cheng & Jiang, 2020). Chatbots driven by AI help HR professionals understand employee sentiment so they can resolve possible roadblocks, take action, and show employees that their voices matter, which enhances employee engagement and decreases turnover.

The use of AI in learning and growth departments was found to increase in the coming years (McLean et al., 2021). These divisions are expected to develop versatile and adaptable learning systems that can accommodate the needs of individual employees. Simultaneously, they will dig deeper into data and analytics to demonstrate impact on the market. The departments must not only teach AI skills and digital dexterity, but also train workers for new positions that inevitably demand more human skillsets, such as logical, strategic, critical thinking, cultural knowledge, and emotional intelligence (Chi et al., 2020). It was found that teams are responding to these trends by adopting agile learning models that promote individual learning rather than offering broad-based solutions for the entire enterprise.

According to Sinha et al., (2020), HR teams use AI to predict employee potential, fatigue, flight risk, and even overall engagement using transactional workforce data, resulting in more productive interactions that enhance employee experience, retention, and efficiency. AI is also used to create smarter, more customized schedules, as well as to review time-off and shift-swap requests in real-time based on predefined business rules (Malik et al., 2020). This gives workers more flexibility over their work/life balance, particularly those who work in frontline/hourly roles and must be present. Using AI to handle these critical yet tedious administrative tasks free up time for managers to spend on the field, interacting with customers, and training teams.

Workforce analytics and planning are becoming increasingly popular among businesses. AI and machine learning are becoming more common in these workforce analytics applications (Sowa & Przegalinska, 2020). AI in HR helps managers solve challenges and make better decisions that influence employee and organizational performance. Managers see the effect of absences, open shifts, and unplanned scheduling adjustments on key performance metrics using real-time analytics, helping them to make better decisions and prevent problems before they occur. Therefore, the research question of how Artificial Intelligence provides Human Resource departments with an opportunity to improve the candidate and employee

experience by automating repetitive, low-value tasks and freeing up time to focus on the more strategic, creative work that Human Resource teams needs and wants to get done is raised.

METHODOLOGY

Interaction analysis would be used to answer the proposed research question. The sampling frame would consist of any organization which has implemented artificial intelligence (AI) in human resource management within the last five years, which would produce a diverse population of firms using AI for recruiting, career management, and training operations. To select the sample, systematic sampling would be used. Ten companies would be selected.

To begin the study, participants would first be asked to take the AI adjustment in human resource test individually and in private to determine their satisfaction (Cheon & Reeve, 2015). In the subsequent part of the research process, four HR duties would be examined: recruiting, performance evaluation, training, and career management. To assess recruitment, candidates would be placed in a room that contained computers and everything they need to apply for a job position. Guidelines would be provided and applicants asked to make a job request using the AI-enabled software. The interaction would be videotaped and transcribed. A coding system would be developed based on the various types of recruitment cues that occurred. To evaluate performance evaluation, participants would be promoted to tell a testimony about a time when they a stressful or tense time in their workplace whenever AI-related assessments are used. Again, the interaction would be videotaped and archived, and the performance evaluation scheme would be developed based on the different types of positive and negative feedback that occurred. Training among the human resource managers would be evaluated throughout the entire research process including the use of AI recruitment affiliated software and discussing a stressful moment at the workplace during performance assessments. The generated data would be compared to participant's scores on the AI adjustment test to determine how their implementation style related to their job satisfaction.

REVIEW OF LITERATURE

Recruitment

Recruitment is the process of recognizing, recruiting, interviewing, choosing, hiring, and onboarding workers. Collmus et al., (2016) suggest that it requires everything from recognizing personnel need to filling it. It was found that recruitment can come under the purview of a variety of employees, depending on the size of the organization. Larger companies may have entire recruiting departments, while smaller companies may only have one. The task may be assigned to the recruiting manager in small companies. Besides, several businesses outsource their hiring to third-party firms. Companies almost all use commercials, work boards, social media platforms, and other methods to find applicants for new positions (Keisling & Laning, 2015). Many businesses use recruitment tools to find top applicants more quickly and effectively. In most cases, recruiting is done in combination with, or as part of, human resources.

Lamba et al., (2020) outlined AI for hiring as a new form of HR technology that aims to cut down on — or even eradicate — time-consuming tasks like manually screening resumes. The most difficult task in talent development is still screening resumes efficiently and effectively promptly: The toughest part

of recruiting, according to talent acquisition executives, is selecting the right applicants from a massive applicant pool. Recruiters are forced to do more for less as a result of this. Seeking top talent in the next few years will be dependent on a recruiter's ability to intelligently automate their workflow. Artificial intelligence (AI) for hiring also refers to the application of artificial intelligence to the recruitment function, such as learning or problem-solving (Pesapane et al., 2018). The new technology aims to simplify or automate some aspects of the recruiting process, especially those that are repetitive and high-volume. For example, software that performs sentiment analysis on job descriptions to detect potentially biased language or software that applies machine learning to resumes to automatically screen candidates.

Leaders of talent acquisition say their hiring rate will rise every year, but their recruitment teams will stay the same size or even shrink. This ensures that recruiters would be expected to improve their efficiency by "doing more for less." Manual resume screening is still the most time-consuming aspect of hiring, particularly when 75 percent to 88 percent of the resumes received for a position are unqualified (Zehir et al., 2019). A recruiter's time is calculated to be 23 hours for a single hire while screening resumes and shortlisting applicants to interview. Esch et al., (2019) say that if AI can effectively automate time-consuming, routine tasks like screening resumes or arranging candidate interviews, it will be a boon to recruiters. The best AI-powered technology would be built to not only automate a part of your workflow but also to integrate seamlessly with your existing recruitment stack so that your workflow isn't disrupted. Time-to-hire is reduced as these aspects of the recruitment process are automated, so you're less likely to lose top talent to faster-moving rivals. By using artificial intelligence (AI) on an existing resume database, intelligent screening software automates resume screening. Based on their results, tenure, and attrition rates, the program determines the applicants went on to become successful and ineffective employees. It specifically learns about current employees' expertise, abilities, and other characteristics, then applies the information to new applicants to rate, score, and shortlist the best candidates automatically. The program can also enhance applicants' resumes by using public data sources such as public social media accounts and public data sources regarding their prior employers.

Owing to an unwillingness to close the data loop, quality of hire was once a bit of a hiring KPI black box. According to Black & Esch, (2021), this is a metric for determining what happens to applicants after they have been recruited. Value of hire has risen to the top of the hiring KPIs as HR data has become easier to obtain, access, and evaluate. The ability of AI to use data to standardize the matching of candidates' expertise, knowledge, and skills to the specifications of the job is the promise of AI for improving the quality of hire. Employees would be happier, more efficient, and less likely to leave as a result of this increased work matching. The preliminary findings are highly encouraging. Pan et al., (2021) suggested that early adopter companies that used AI-powered recruitment software saw a 75 percent reduction in cost per screen, a 4 percent increase in revenue per employee, and a 35 percent decrease in turnover.

On the other hand, to learn how to accurately simulate human intelligence, AI needs a large amount of data. According to the mating theory of recruitment, organizations search out candidates, and applicants seek out organizations (Ahmed et al., 2015). Both organizations and applicants must not meet, and conditions satisfied while using AI. Machine learning AI, for example, requires a large amount of data to learn how to screen resumes as reliably as a human recruiter. This may range from hundreds to thousands of resumes for a single position. Besides, by ignoring details like a candidate's age, gender, and race, AI for hiring promises to eliminate implicit bias. AI, on the other hand, is programmed to look for trends in previous actions. That means AI will pick up on any implicit bias in your hiring process. HR managers should make sure the AI software provider they are using is aware of the problems and

6

has taken measures to eliminate obvious trends of possible prejudice to avoid replicating any prejudices that might already exist (Roulin et al., 2015). Moreover, there is skepticism of the new technology. HR professionals are often bombarded with the latest and greatest trend, which easily fades away. Recruiting and talent management executives are understandably wary of any technology that claims to make their work easier. They want to know that any program that will be used to automate one of their work tasks will be able to perform as well as they can.

Performance Evaluation

Performance evaluation is the method of determining how well workers are doing their jobs and leading to the achievement of organizational objectives. An HR manager must be aware of the basic expectations for a job, track the employee's actions and results, equate observed behavior and results to expectations, and assess the match between them to effectively appraise performance as suggested by Kromrei, (2015). Performance reviews are critical to an organization's success, even though they can be difficult to carry out. They say whether a company's selection methods are efficient. Also, they show where preparation, growth, and motivational programs are required and later assist in determining if they were effective.

Data-driven performance management helps the company and team leaders in concentrating on factual data and performing employee performance assessments. Employees must be able to cooperate and make decisions. According to Jarrahi, (2018) AI is now a great way for businesses to calculate the outcomes of such partnerships. It allows for the processing of data to be done in real-time. Employees will otherwise have to scour various office floors for the details they need. It's fine if managers have enough time to make those decisions. As a result, AI ensures that all information is processed in a single location. This data, or employee knowledge, assist leaders and stakeholders in evaluating employee performance and sharing it with other team members. Besides, real-time analysis enables the manager to rapidly extract insights. This is because continuous performance monitoring necessitates real-time analysis. It was found that nobody wants data or knowledge that is no longer current (Floridi et al., 2018). That would also be of no interest to anyone. Therefore, accurate data is supplemented by real-time analysis, which assists in the enhancement of overall employee performance. Moreover, it removes any psychological prejudice. Indeed, it is one of the most important reasons why artificial intelligence dominates performance management, measurement, and evaluation.

Hanmer & Kalkan, (2012) outlines that employees are dissatisfied with the annual performance feedback loop, which is based largely on historical data and personal experience and occurs only once a year. The conventional approach does not add value to the business. Performance reviews and appraisals are common occurrences in the workplace and have been thoroughly studied. Organizations, on the other hand, often depend on annual or biannual performance feedback cycles, which fall short of capturing the full image of an employee's capacity. There's also the possibility of prejudice creeping in because a single boss is in charge of their team's performance evaluations and might display favoritism towards a particular employee (Guan et al., 2020). This is why developing a data-driven culture is crucial, with technologies like artificial intelligence (AI) supplementing human opinion when it comes to receiving performance feedback.

With talent pipelines becoming more complicated (a shortage of highly qualified staff, declining employee satisfaction, and a competitive recruiting environment), it's critical to be agile to keep employees. Providing reliable and frequent performance reviews is one of the employee retention techniques. In HRM, artificial intelligence (AI) assists in accurately assessing performance and providing managers

with the appropriate feedback. The conventional feedback and assessment period haven't changed much over the years. Companies believe their performance improvement strategy is successful. AI and data analytics, on the other hand, provide a single source of reality from which managers can derive useful insights. Managers have historically based their appraisals on workers' self-assessments, peer evaluations, and proven business results. Inevitably, their perceptions of employee potential and career advancement opportunities within the organization can influence feedback. Furthermore, an HR manager can lack the foresight required to synchronize performance feedback based on historical data with future paths. AI interference is important. AI's predictive capabilities can use data from a variety of sources to forecast an employee's likely career path and assess appraisal figures.

The value of data-driven decision-making in HR is rising all the time, and executives are beginning to note. Companies used employee data to calculate the period of control, the distribution of performance scores, the succession pipeline, and other talent-related issues in the early days of HR analytics (Elish & Boyd, 2017). With all of this latest data entering the workplace, the field of people analytics is becoming increasingly personal. The next logical step is to use AI to decipher analytics data and provide predictive insights that supplement a manager's human intuition and knowledge. AI validates predictive appraisals. It facilitates continuous real-time assessments. Regular feedback sessions are made easier by the use of modern and agile performance management practices. Artificial intelligence eliminates the need for and responsibility of rigid performance assessment cycles. As a result, it provides more versatility and useful information. It speeds up the feedback process and guarantees that it is delivered on time. This is critical because inconsistent feedback can harm overall employee success. Timely input quickly identifies areas for improvement and increases business efficiency (Sima et al., 2020). Managers typically complete the evaluation process by looking at past data reports and their assessment of employee potential. If data sets are incomplete or employee performance changes significantly during evaluation periods, this mechanism is rife with errors. For example, because of bad results in the previous cycle or during one low time in the current cycle, a high-performing employee could be trapped with subpar compensation. This paradigm is turned by artificial intelligence (AI), which analyzes data to predict potential success levels, enabling managers to reward workers for what they can achieve rather than what they have already accomplished.

Managers can administer performance evaluations that are free of prejudice. AI identifies places where different workers can change. It alerts the manager of any shortcomings in an employee's performance and suggests ways for them to change. Employees may use AI to reinvest their skills long before they become obsolete. AI does not remove jobs; instead, it assists workers in staying relevant and developing their skills. This alleviates the fear of people being obsolete. Interpersonal abilities and mathematical intelligence will still be valuable. AI measures employee performance primarily based on past performance data and achievement of current performance indicators, and then predicts future performance. Frequently, a prejudice develops without the manager being aware of the consequences. AI assists managers in optimizing the assessment process while also instilling confidence in team members by offering constructive performance reviews. A course correction can be started right away. Prescriptive guidelines are possible with AI in performance assessment. Rigid analytics outlines specific recommendations for managers to follow, while historical analytics considers past data and predictive analytics discuss potential possibilities. Prescriptive AI, on the other hand, detects performance differences in employee growth. AI identifies such needs early in the review cycle using real-time analytics, allowing managers to upskill an employee for a new position before the assessment season arrives.

Conversely, when AI is used, the manager's function is reduced from that of the person in charge of performance reviews to that of a moderator or facilitator. The lack of the human factor in the assessment phase creates a discrepancy between the employee and the company if workers have grievances regarding their evaluation. Besides, the AI can only run and operate in the manner in which it is programmed. It remains to be seen if it will equal the versatility of human intelligence. The real-world consequences of a lack of human intelligence may be detrimental to workers in the long run (Hyun et al., 2017). Overreliance on AI and connected technologies limits human potential and decision-making abilities. Organizations must demonstrate concern for their workers' plights and adjust performance evaluations accordingly. AI lacks emotional intelligence to cope with these circumstances. An organization's dependence on AI causes harm to firms if human potential fails to rise to such crisis scenarios (Hoel & Mason, 2018). It is critical that companies carefully consider how and where they want to integrate AI into the performance evaluation process. They must carefully monitor where AI simply supplements human intelligence and assists managers in doing their jobs and making informed decisions, rather than taking over and being invasive when gathering data (Barredo Arrieta et al., 2020). This combination of AI-driven data's convenience and quantifiability, as well as the requisite human feedback, results in an engaging employee evaluation experience for all parties involved.

Training and Coaching

In a business setting, training is a process in which a more experienced or professional person offers advice and instruction to an employee to help them improve their skills, efficiency, and career (Albrecht et al., 2015). Coaching is a highly personalized process that is dependent on the client's needs as well as the coach's experience, expertise, and abilities. Training is required at all levels of employment and for all employees. It is important for keeping current with constantly evolving technology, principles, beliefs, and the climate. To enhance the quality of work of employees at all levels, training programs are often required in every organization. It is also expected when an individual is transferred from one type of assignment to another. In light of this, this unit seeks to provide insight into the concept, need, and methods of training, as well as areas of training assessment, retraining, and organizational learning dimensions. Thus, training is a method that aims to develop skills or expand expertise so that an individual is better prepared to perform his current job or is molded to be suited for a higher job with more responsibilities. It fills in the gaps between what the employee already has and what the work needs.

The controversy about whether leaders are born or created has raged for centuries. Some claim they are born, while others say they are developed through training and coaching. Organizations have huge teams, and one-on-one coaching is not practical, although this type of coaching adds a personal touch and helps the team connect stronger. Using AI to coach a person in multiple skills may help not only with skill scaling but also with team building. An individual is placed in training because he or she lacks the requisite skills to perform a specific task (Denison et al., 2015). It was found that every year, most of the workers of knowledge-based organizations undergo a Training Needs Analysis (TNA). A typical TNA involves finding gaps in employees' knowledge and skills concerning the skills needed to complete planned tasks on time. Denison et al., (2015) suggest that the analysis not only offers a training plan for individual workers on how to close the gaps found, but it also identifies the soft skills needed to function in a team. Personalized preparation for every employee to close capability gaps necessitates a larger training and development budget. This is where AI can benefit by coaching a person in multiple skills at a fraction of the cost of traditional training and development.

Dwivedi et al., (2021) outline Artificial Intelligence and machine learning assist in the coaching of younger generations who are entering the workforce in novel ways, saving time and money. After each coaching session, the AI coaching tools provide immediate feedback. They also aid in the identification of coaching needs, linguistic patterns, and strategic planning models. Artificial intelligence (AI) research has made considerable strides in solving the classic training transition issue by assisting learners in the interim between sessions with an artificially intelligent coach. AI has offered a secure environment in which to learn challenging, risky, or humiliating skills (Puaschunder, 2019). Coaches were traditionally recruited from the outside to train within an organization or were also employed by the company's own human resources department. They could be charged with maintaining and cultivating top performers, or they could be asked to serve as a sounding board for a strategic business decision. Coaching is a valuable method for individuals to learn new skills, work toward goals, or simply improve their trust on a personal and professional level.

The AI speech coach offers teams more customized perspectives, improving productivity and performance across the board. Besides, the software provides personalized lessons, measures performance, and provides real-time reporting. Several companies are now using online training systems to help prepare their employees by providing them with a consistent training experience. HR managers use AI-based eLearning software to efficiently train their teams. This also helps team members to close skill gaps and meet training objectives. When compared to humans, AI is capable of gathering vast amounts of data, analyzing, interpreting, and storing it. Artificial intelligence (AI)-based tools detect trends and assist managers in making data-driven decisions more quickly (Tussyadiah, 2020). Based on the quantitative support provided by AI software, managers recommend trends and offer actionable advice. Coach bots can recognize trainees' learning habits and provide coaching accordingly. As candidates learn at their speed based on their learning ability, AI aids in providing more customized learning experiences. One-size-fits-all is no longer a term in AI. There is no need for the whole department to attend training. Individualized learning aids in the achievement of custom objectives.

Trainers use smart eLearning software to break down big training modules into short lessons that are easy to understand and learn. The coaching method now includes small quizzes, surveys, and reviews. By determining who is participating in the coaching, AI aids in providing deeper insights into these surveys. Instead of asking people to sit through hour-long lectures, task-based onboarding has proven to be more successful. Virtual training is now possible thanks to artificial intelligence. The number of workers working remotely and for longer hours is rising. Some businesses claim that remote employees are more effective than those who work in an office on a set schedule. Larger businesses with a head office in one location and branch offices in other regions can't train all at the same time and in the same location. This problem is solved by AI, which promotes virtual training and provides training by personal virtual assistants. Anyone may attend these training sessions, whether they are at home or work. Individuals have benefited from AI in terms of improving their communication skills. Natural language processing is used to design AI-based tools that enable people to learn skills in their native languages. Since it provides customized learning and growth, adaptive learning has proven to be a successful way to engage the workforce.

AI helps businesses to improve their corporate culture using behavioral sciences and machine learning. It examines the company's data, such as demographics and employee surveys, and uses the information gathered to boost employee satisfaction and retention. It also sends emails to staff, requesting that they alter their actions to increase their performance. People have become loners as a result of their hectic lives, and stress levels have risen. Depressed people are motivated and inspired by artificial intelligence.

10

Humu, for example, is an AI-based life coach who assists people in cultivating emotional strength (Lane & Martin, 2021). Instead of a series of directions written in a book, today's learning is all about the flow or connectivity of ideas. AI assists in the development of personalized learning experiences and a "learning path curve" for them. When coaching others, feedback and analytics are extremely important. The HR manager needs to know whether or not the employees have experienced something. Managers can learn and improve soft skills with the aid of AI-based tools. It examines the causes of job difficulties, including whether they are related to stress, the work environment, or poor communication skills. According to experts, the AI coach is superior because they are not biased when teaching individuals. They will quickly comprehend a person's intellectual level and emotional well-being, as well as evaluate and report on what they've learned at the end of the session. Companies cannot afford to hire trainers for every employee, resulting in a large number of skills shortages that must be filled, affecting the bottom line. This is when artificial intelligence is used to coach a person in a variety of skills. While AI-based coaching has several drawbacks, it also has several benefits, such as the ability to train a larger number of teams.

Career Management

Career management is a lifelong method of allocating resources to meet your long-term professional objectives. It's a never-ending process that helps you to adjust to the evolving demands of our fast-paced economy. Self-awareness, career growth planning/career discovery, life-long learning, and networking are all topics that are incorporated into the career management process. Employers have a major impact on the futures of their staff. Some companies have structured career management systems in place, while others do not. Career management can be described as a process that enables employees to better understand and improve their career skills and interests, as well as to use those skills and interests most effectively both inside and outside the business. Providing realistic work-oriented appraisals, posting open positions, and offering structured career development programs are all examples of career management activities. A lifetime of activities like workshops that lead to a person's career discovery, establishment, achievement, and fulfillment is referred to as career growth. Career planning is the deliberate process by which an individual becomes aware of his or her abilities, preferences, experience, motives, and other characteristics; gathers information about opportunities and choices; determines career-related goals, and develops action plans to achieve those goals.

All human resource operations within the company must be organized, and human resource managers should be involved as consultants at the very least. The career-planning program must be available to all employees, and it must be flexible enough to accommodate the wide range of individual variations that may be encountered. Participants receive realistic input with an emphasis on psychological achievement rather than merely progression. Employees find it difficult to maintain the years of training required to achieve career goals if they do not receive input on their efforts. New program implementation starts with small pilot projects that focus on assessing employee skills and program interactions regularly. Supervisors have a critical part to play (Makridakis, 2017). Their responsibilities include transmitting job information to subordinates, counseling to help subordinates define skills and options, assessing subordinates' results, strengths, and weaknesses, coaching or teaching skills and behaviors, advising on organizational realities, acting as a mentor or role model for subordinates, and brokering, or bringing subordinates together.

Managing employees 'career is a continuous operation. Errors in career management may be prolonged and replicated if continuous, informed, and successful career management is not practiced. Furthermore, the ever-changing world necessitates continuous career management. Personal satisfaction, work/life balance, task accomplishment, and financial stability are all outcomes of good career management. Career management focuses on two main financial assets to maintain during the working years, personal lifelong learning and a network of partnerships, even though the strategies differ. Although they are not the same, career management encompasses both professional and personal growth. Career growth is a lifelong process of balancing schooling, employment, leisure, and transitions to move toward a desired future that is both personal and changing. Companies are still working out how to make the most of the latest technologies and what effect machine learning would have on their operations and employees (Mendling et al., 2018). Employers have a social duty to train their workers for a future that does not yet exist in a rapidly changing job market. Since skills have a five-year shelf life on average, assisting workers in learning and upskilling is critical to their long-term success as well as the bottom line of a company. Present workers must be prepared for the future of employment. Deeper evaluations and longer-term strategies are required to identify skills gaps, identify opportunities, and transfer talent to where they are both needed and desired.

Employees are guided in the right direction by artificial intelligence. When HR professionals realize how much time and effort it takes to prepare and personalize each employee's career path, the concept easily loses its allure. However, artificial intelligence (AI) is reviving the importance of job pathing in employee satisfaction and retention, succession planning, workforce planning, and overall efficiency and profitability (Karmakar & Sahib, 2017). AI matches workers to appropriate next-step positions based on their profiles by doing most of the heavy lifting, similar to how it relates external applicants to recommended roles. To make the most of automated career paths, workers are inspired to learn, apply, and develop their skills, and someone on the other end must help actualize employee growth through mentorship, project-based work, and vertical or lateral steps. Giving workers the resources, they need to navigate and develop their careers from the comfort of a work culture they've already embraced is a game-changer when it comes to attracting top talent and filling key positions. It is the standard, not the exception, to have effective career growth plans. They provide a realistic, goal-oriented process for all parties concerned, resulting in a win for both employers and employees now and in the future.

CONCLUSION

Artificial intelligence in human resource management was addressed in this literature review in terms of recruiting, performance assessment, training and coaching, and career management operations. It enables HR departments to improve the candidate and employee experience by automating repetitive, low-value tasks and freeing up resources to focus on the more strategic, disruptive work that HR teams need. The study would advance artificial intelligence research by assisting HR managers in learning more about HRM digitization and allowing them to better embrace technology in their organizations. In an enterprise where technology is viewed as a risk, it is critical to conduct research that will contribute to the advancement of information about how to successfully automate the human resource department using artificial intelligence.

Human resource is the department in charge of determining an organization's employee profile, overseeing hiring processes, ensuring preferred applicants' adaptability to the organization, monitoring employee satisfaction, and ultimately being responsible for the personnel's success and productivity. Artificial intelligence (AI) is used in almost every area and industry, including human resources. According to human resources professionals, AI would encourage HR professionals to expand their current roles and become more strategic within their organizations by enabling them to learn new skills and free up time. It's difficult for HR practitioners to keep up with the rapid pace of technical change in the workplace. As a result, HR practitioners must think about how AI is reshaping the industry now more than ever.

Artificial intelligence (AI) integration into human resources (HR) operations benefit businesses because these systems would analyze, predict, and diagnose data to help HR teams make better decisions. AI helps with recruitment, planning, onboarding, success assessment, and retention. The majority of enterprises are also lagging because of the high cost of integrating AI into HR operations. AI's launch is perceived as a good opportunity because it enhances people's lives. It will contribute to a better future if it is properly understood and implemented. HR professionals may use artificial intelligence to get data-backed tools and clear employee insights. This motivates HR professionals to take action to provide the employee experience that the workforce requires, resulting in increased engagement and lower turnover. Leadership must also pay attention to and act on recommendations from workers. One of the ways that HR can communicate with and consider the needs of a large number of employees is through artificial intelligence. Employee engagement is a science, and evaluating and analyzing employee sentiment regularly is a vital component of that science. AI-powered chatbots are used by employees and HR practitioners throughout the year to keep the engagement conversation going.

Artificial intelligence (AI) for recruiting is a new type of HR technology that seeks to reduce — or even eliminate — time-consuming activities such as manually screening resumes. The most challenging challenge in talent recruitment remains efficiently and effectively screening resumes promptly: According to talent management executives, the most challenging aspect of hiring is choosing the best candidates from a wide pool of candidates. As a result, recruiters are being pushed to do more for less. In the coming years, a recruiter's ability to intelligently automate their workflow will be crucial in attracting top talent. Businesses can now use AI to measure the effects of such collaborations. It permits real-time data processing. Otherwise, employees would have to search several office floors for the information they need. If managers have enough time to make these decisions, that's great. Therefore, AI makes sure that all data is stored in one location. Leaders and stakeholders may use this data, or employee knowledge, to evaluate employee performance and share it with other team members. Furthermore, real-time analysis enables the manager to extract information quickly. Real-time analysis is needed for continuous performance monitoring. Nobody wants out-of-date information or expertise. For decades, the debate has raged about whether leaders are born or made. Some people believe they are born with them, while others believe they are created through training and coaching. Since organizations have large teams, one-on-one coaching is not feasible, although it adds a personal touch and strengthens team bonds. Using artificial intelligence to coach a person in multiple skills could assist not only skill scaling but also team building. HR professionals may use artificial intelligence to get data-backed tools and clear employee insights. This motivates HR professionals to take action to provide the employee experience that the workforce requires, resulting in increased engagement and lower turnover. Leadership must also pay attention to and act on recommendations from employees. Artificial intelligence is one of the ways that HR can interact with a large number of workers and understand their needs.

To address the proposed research query, interaction analysis will be used. Any company that has incorporated artificial intelligence (AI) in human resource management during the last five years will be included in the sampling frame, resulting in a diverse population of companies that use AI for hiring, job management, and training operations. Systematic sampling can be used to pick the sample. Ten businesses will be chosen. To begin the analysis, participants will be asked to take a person and private AI adjustment in human resource test to assess their satisfaction. Four HR responsibilities will be discussed in the next stage of the research: hiring, performance assessment, preparation, and career management. The created data will be compared to the AI adjustment test scores of participants to see if their implementation style influenced their job satisfaction. As a result, recruiters are being pushed to do more for less. In the coming years, a recruiter's ability to intelligently automate their workflow will be crucial in attracting top talent. Businesses can now use AI to measure the effects of such collaborations. It permits real-time data processing. Leaders and stakeholders may use this data, or employee knowledge, to evaluate employee performance and share it with other team members. Furthermore, real-time analysis enables the manager to extract information quickly. Real-time analysis is needed for continuous performance monitoring. Nobody wants out-of-date information or expertise. For decades, the debate has raged about whether leaders are born or made. Some people believe they are born with them, while others believe they are created through training and coaching. Since organizations have large teams, one-on-one coaching is not feasible, although it adds a personal touch and strengthens team bonds. Using artificial intelligence to coach a person in multiple skills could assist not only skill scaling but also team building. HR professionals may use artificial intelligence to get data-backed tools and clear employee insights. This motivates HR professionals to take action to provide the employee experience that the workforce requires, resulting in increased engagement and lower turnover. Leadership must also pay attention to and act on recommendations from employees. Artificial intelligence is one of the ways that HR can interact with a large number of workers and understand their needs.

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Chapter 2
A Novel Review on the Adaptation of Artificial Intelligence in Human Resources Management by Organizations in Gulf Countries

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ABSTRACT

The purpose of the study is to understand the phenomenon of using artificial intelligence (AI) in human resources, especially in the gulf countries. This research effort provides a future perspective of using AI to better understand HR practitioners' attitudes and perspectives within multiple frameworks and the implications that technological advancements, in particular AI, have for the recruitment process. The study reveals that gulf countries will implement a vision (2030 vision) that will have a great opportunity to keep up with the digital transformation. It aims to investigate where AI can be implemented in the traditional recruitment process and possibly make the process more effective, as well as about what the implications would be of having AI within recruitment which leads to change in the composition of the workforce within organizations. It is urged that modern AI applications are an essential approach for organizations that work in an inconsistent environments.

INTRODUCTION

Artificial Intelligence is representing a real breakthrough in business management and will have a profound impact on the way employees work, especially in the human resources and employment departments. Artificial Intelligence (AI) technologies have an impact on the management of human resources in a deferent way. For instance, design training and development plans for each employee from background processes, based on big data or data analytics related to employment practices in real time. Artificial

Intelligence refers to technology used to do a task that requires some level of intelligence to accomplish. In other words, a tool trained to do what a human can do. The use of artificial intelligence, in a practical and effective manner, lead to improve the achievement of the human resource management work tasks, whether in the field of employment, evaluation and performance measurement, HR planning, training needs of employees, job evaluation, or even forecasting the labor market and its needs and indicators (Aldulaimi et al. 2016; Abdeldayem et al. 2019). With the rapid change of technologies, we are already beginning to witness a case of creative use of AI in ways that can add more positive benefits to the workflow, according to a review by the industry-leading provider of cloud-based applications for industry-specific applications. On the work of employees in the human resources and recruitment departments. Various companies and organizations have already demonstrated how AI can contribute to improve the quality of care and/or decreasing costs (Mesko B. 2017). In about 20 years, 50% of jobs will be outdated or not needed anymore, and healthcare is not an exception (Acikgoz Y. 2019). Taking the time to understand the benefits and pitfalls of different methods is just as important as building the right algorithms and data infrastructure. Fig 1 shows the HRM process in detail.

Figure 1. HRM process
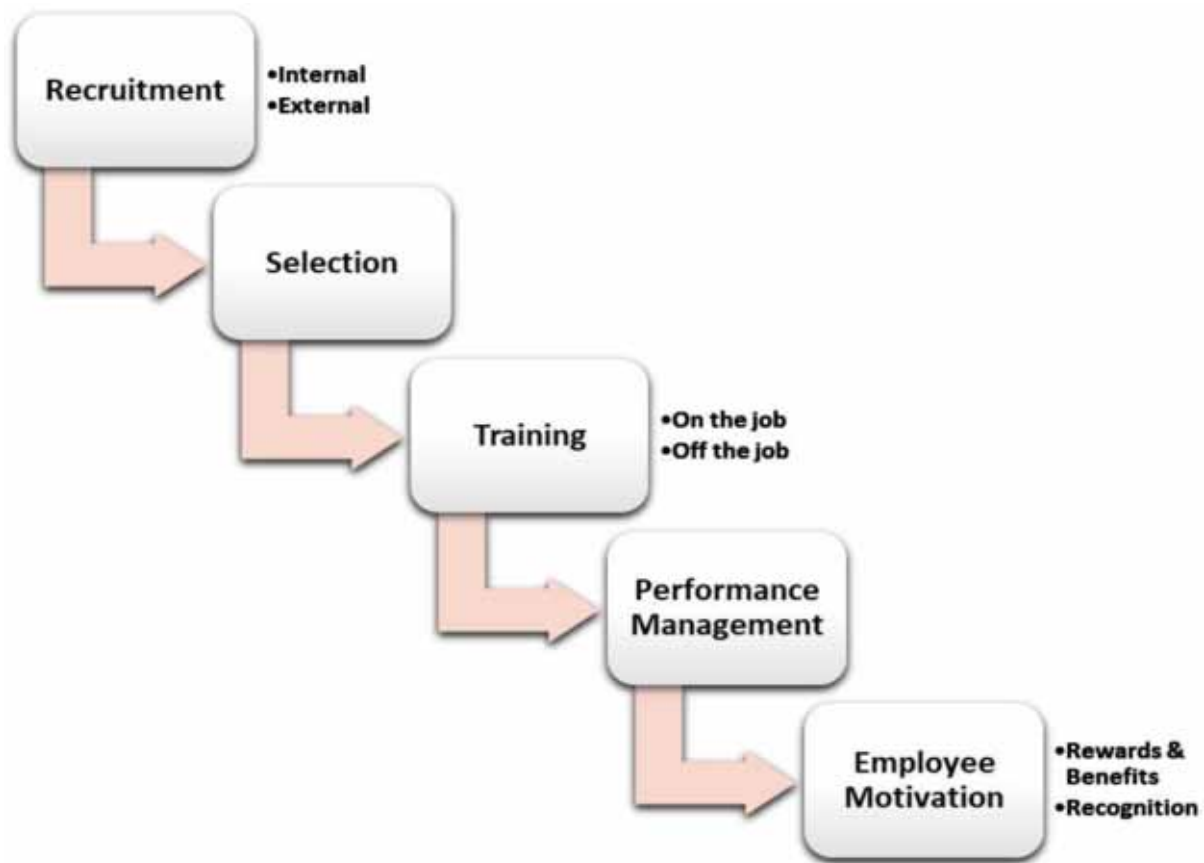
LITERATURE REVIEW

The purpose of this section is to provide the theoretical background to the topic of Artificial Intelligence in the recruitment process by reviewing past literature conducted on the subject. It will cover the themes of HRM, the traditional recruitment process, Artificial Intelligence, online recruitment and lastly the application of AI on recruitment.

Human Resource Management (HRM)

There are many definitions of human resource management brought forward by a range of researchers, however most of the definitions do complement each other. A definition by Schemerhorn given in 2001 is that HRM is how you are able to gain and develop a workforce which is talented, to help the company achieves its goals, as well as its mission, vision and different objectives at hand. Another definition is that HRM is an approach to employee management with the aim of retaining a workforce which is both capable and committed by different techniques, such as cultural, structural and personnel to bring the organization a competitive advantage (Storey, 2004). For the purpose of this study, HRM will be defined as the process of acquiring and maintaining new skills, capabilities and competences in an organization through its workforce by the means of different management techniques.

HRM practices include recruiting new employees, managing employees, hiring employees and developments (Wall & Wood, 2005). Most of these practices have a specific focus on retaining new employees and keeping up their satisfactory level. This is because human resources are such a dynamic part of the company and is ever changing, therefore it needs the right management by an organization (Bibi, Pangil & Johari, 2016). The management and retention of HRM can be argued to have a special importance within manufacturing companies which beholds a focus on innovation within manufacturing to get a comparative advantage and better performances (Youndt, Snell, Dean & Lepak, 1996). The role that HRM have within an organization have changed severely during many years and are no longer just used as a way to manage an organization's internal costs of labor (Becker & Gerhart, 1996). More recent researches are looking into HRM as being a strategic asset to organizations where employees are the key assets and how to acquire and manage these play the most important role (Bas, 2012). In the following section recruitment in HRM will be discussed followed by a section on selection in HRM.

Recruitment in HRM

The research conducted within recruitment as a part of HRM has increased in the later decades and there is now more available research on how recruitment actually impact applicant behaviors and employee behavior (Taylor & Collins, 2000). Recruitment is defined as the practice of finding the right candidates which make up a candidate pool which fits an open job vacancy that a company have (Stoilkovska, IIieva & Gjakovski, 2015). Recruitment can also be considered the centerpiece within HRM, as it is those employees that are hired who will be subject later on to the other HRM practices. (Griepentrog, Harold, Holtz, Klimoski & Marsh, 2012). This is further supported by Newell (2005) who states that it is very important to have competent personnel in organizations, which is fulfilled with an effective recruitment and selection process. If the wrong person is hired, the organization can suffer from several economical losses instead (Newell, 2005; Muir 1988). However, being able to hire the most competent and best employees on the market is becoming increasingly hard amongst the competition on the job market

(Taylor & Collins, 2000; O'Donovan, 2019). The way recruitment is being conducted has therefore, due to the competition, changed. It is no longer possible to use the same recruitment sources as before, instead companies nowadays use more innovative ways of recruiting their employees as a way to stand out from competitors. (Taylor & Collins, 2000). What can be drawn from this is how important it is for every organization to try to keep up with recruitment trends and how recruitment is developing.

Selection in HRM

Selection is the second process which is undergone when hiring new employees. It usually takes place after the organization have been doing initial recruitment where they establish a pool of possible qualified applicants, and now have to select the right applicant for the job (Newell, 2005; Stoilkovska et al. 2015). A comparison which can be done of selection is to that of a jigsaw puzzle, as stated by Newell in 2005, where a company tries to select the correct piece to the puzzle out of a bunch of wrong pieces. Selecting the right employees is most commonly conducted by traditional methods, such as interviewing the candidates. However, this is a practice which companies slowly exchange to more non-traditional methods as a way to increase the reliability of the selection (Elearn, 2009). One of the important things to consider when doing the selection is everyone in the established pool of candidates should have an equal chance to be selected for the job (Stoilkovska et al. 2015).

Some methods used for selection includes pre-selection, interviews and assessment centers. To evaluate the right selection method for an applicant there are three methods, usually applied as follows: reliability, validity and usefulness. In validity, applicants can be scored on a scale with job performance on y axis and team-working score on the x axis according to "false negatives" or "false positives" - either people were thought to be bad, but they were good, or people were thought to be good but ended up performing badly (Newell, 2005). The final selection decision is usually taken by one person in the end, most often a recruiter with experience within the job who can take adequate decisions on who would fit the job. There is also the possibility in larger corporations to have the final selection be decided by a panel with some of the main personnel in charge of the employees, such as line managers and chairman. This method eliminates the pressure of experience and abilities the individuals need to have and can also help eliminate some factors of biases toward candidates (Muir, 1988).

TECHNIQUES - ANALYSIS OF ARTIFICIAL INTELLIGENCE

The Concept of Artificial Intelligence (AI)

Artificial Intelligence (AI) has been around for a long time and have had a wide area of application throughout the years, but only during the later year has the technology been further developed and implemented within many different organizational settings (Tecuci, 2012). To understand the concept of AI, the easiest way is to break down the words by themselves to look at each meaning. However, even though AI have been around for a longer period of time there is not one pre-determined definition of the concept (Legg & Hutter, 2007). Many researches who bring forward definitions focus to define the 'I' in AI, usually because this is harder to pinpoint. The definition of 'A', that is Artificial, is a universally agreed on term and therefore does not need as much defining (Bringsjord & Schimanski, 2003). Artificial, defined according to Oxford Dictionary is something "made or produced by human

22

beings rather than occurring naturally, especially as a copy of something natural" (Oxford Dictionary, 2019). Therefore, it can be established that artificial is what humans have made to simulate something that usually occurs naturally.

The tricky part then lies within defining intelligence. Some would define the term of AI as the creation of robots, machines or programs which inhabits what could be seen as similar intelligent behavior as human have (Tecuci, 2012; Kaplan, 2016). The problem with this definition is having to measure human intelligence to compare it to that of the robots or machines inhabiting it. (Kaplan 2016) instead states that his own personal interpretation of intelligence would be that it is "the ability to make appropriate generalizations in a timely fashion based on limited data" (p.5). Many other more informal definitions of intelligence include it being when something has the ability to think, plan, have knowledge, adapt to

environment or retrieve information (Legg & Hutter, 2007). It could also be the ability to understand data and from that make decisions based on the data as well as the situation at hand (Ved, Kaundanya & Panda, 2016). As an example, it could be that a program can learn how to play games such as tic-tac-toe, or how to recognize individual faces or compose music - then it is artificial intelligence (Kaplan, 2016). For the purpose of this study, AI is defined as the ability of such things as machines to learn, interpret and understand on their own in a similar way to that of humans.

There are many areas where AI can be implemented and it can take place in many different forms. For an example, it can be as a machine, robot, computer program or software (Tecuci, 2012). Some of the technological areas in which AI have expanded to is robotics, processing of natural language, expert systems as well as automated reasoning (Ved et al. 2016). Furthermore, according to Ved et al. (2016) there is five different main areas of implementation of AI which are firstly interpretation of language, secondly machine perceptions, thirdly problem solving, fourth robotics and lastly games. These implementation areas are also further supported by Tecuci (2012) who have knowledge acquisition, natural language and robotics as some key areas for AI.

The Application of AI in Recruitment

According to Upadhyay and Khandelwal, the application of AI in HRM was one of the most remarkable trends among recruitment professionals in 2018. Stuart and Norvig (2016) defines information extraction as a process where information and knowledge can be gathered by scanning a text. Especially in recruitment of new employees, AI can be used by information extraction techniques that can make the process of resume scanning and extraction of relevant information automated (Kaczmarek, Kowalkiewicz & Piskorski, 2005). Since the number of job applications have increased and can even overwhelm HR departments, automated systems that ranks job candidates have been presented to accelerate the hiring process. HR department usually manually conduct the evaluation of the received job applications, hence applicant ranking systems which can be created with the utilization of AI can make recruiters evaluation task more efficient (Faliagka, Ramantas, Tsakalidis & Tzimas, 2012). Candidate ranking system works at the power of AI algorithms and human recruiters providing training data for the AI algorithms, from where they learn the scoring function of applicants (Faliagka et al. 2012). Upadhyay and Khandelwal introduces in 2018 chat bots that are AI-driven recruitment assistants that enable personal and up-to-date connection possibilities with candidates via emails, text messages or dialogue box. There are several computer-supported job matchmaking techniques which have been developed in order to ease the workload of recruiters. Such techniques include software that sorts resumes and can be implemented by exploiting learning based techniques and algorithms (Montuschi, Gatteschi, Lamberti, Sanna, & Demartini, 2014).

An interesting feature of AI-based ranking systems is the possibility to gather information about applicants' personality traits that are extremely important when fulfilling job positions. However, these traits are often observed during job interview, but preliminary data can be acquired through web searches. By conducting linguistic analysis to applicants' blog post or LinkedIn pages, it is possible to gather information about applicants' personality trails, mood and emotions (Faliagka et al. 2012). Job interviews conducted as a video interview have become a popular recruiting tool among companies. An application for video interviews that utilize AI has been developed by HireVue. In this application AI is able to interpret and analyze applicant's body language, facial expressions or tone of voice. The application compares the interviewed applicants to the top talent employees in the company and finally suggest the best applicants to recruiters (HireVue, 2018). The global hotel chain Hilton experienced several benefits of conducting video interviews, whereas the most remarkable implication was the decrease in the amount of time spent in recruitment process. Before the recruitment process took 42 says in Hilton hotel, but due to use of AI based video interviews, it takes only 5 days (HireVue Case Study, 2017.)

(Strohmeier 2015), he discusses regarding the central functionalities of Artificial Intelligence Techniques and the central requirements of Human Resource Management based on the task-technology fit approach with six selected scenarios. Details were based on the foundation and exploration regarding turnover prediction with artificial neural networks, candidate search with knowledge-based search engines, staff rostering with genetic algorithms, HR sentiment analysis with text mining, résumé data acquisition with information extraction and employee self-service with interactive voice response.

(Bhardwaj, Singh & Kumar 2020), study shows the relationship between artificial intelligence and human resource functions in IT industry in Delhi/NCR region whether this relationship is moderated by innovativeness and ease of use of HR operations. This is quantitative research based on Artificial Intelligence and HR functions using multiple regression method to test hypothesis and confirmed positive relationship between these factors. This study shows a positive insight of Artificial Intelligence which is coming as a new revolution in industry with the new name Industry 4.0.

(Kshetri. N 2021) AI deployment in HRM have a potential positive impact on the development, retainment and productive utilization of employees. This paper uses multiple case studies of AI tools in HRM in Global South in recruiting and selecting as well as developing, retaining and productively utilizing employees with the use of artificial intelligence in human resource management. AI deployment in HRM, organizations can enhance efficiency in recruitment and selection and gain access to a larger recruitment pool. AI in HRM, is s subjective criteria such as nepotism and favoritism are less likely to come into play in recruitment and selection of employees.

Benefits of AI-Based Recruitment

According to Dickson and Nusair the aim of recruitment systems is to ease organizations and save expenditure by modernizing their recruitment process. Recruitment systems are planned to make the recruitment process quicker by different kinds of functions such as prescreening and sorting resumes and then matching these resumes to open job vacancies. Hence this enhance managers' task when it comes to finding qualified job applicants both in the terms of increased speed and efficiency (Dickson & Nusair, 2010). In addition, Dickson and Nusair found that the use of AI in recruitment process enables organizations to reach larger candidate pool and there is less paperwork to be done. Furthermore, AI can skim the data that is posted on social media and hence it is possible to get access to applicant's values, attitudes and personality traits (Upadhyay & Khandelwal, 2018) that traditionally have been discussed

24

during the job interview (Faliagka et al. 2012). Hence, due to AI systems it is possible for recruiters to scan job applicants' personality traits already before a job interview (Faliagka et al. 2012). Upadhyay and Khandelwal mentions that AI act as unbiased and resumes are screened fairly in a way that it provides equal chance to all applicants. When it comes to candidates who were rejected from the job vacancy, AI systems allow feedback about their qualifications and skills that these candidates can develop further in the future (Upadhyay & Khandelwal, 2018).

By conducting traditional face-to-face interviews with potential job applicants, organizations confront several costs, including the costs of supervisors and managers who are present during the interviewing and hiring processes. In addition to these benefits, the decreased amount of manual work in hiring process yield more time to focus on those potential job candidates who are suitable for available job vacancies (Guchait, Ruetzler, Taylor & Toldi, 2013). According to Leong, the use of AI in recruiting enables recruiters to connect with the best talent management candidates instantly rather than spending enormously time and resources on reading and scanning through received resumes. AI-based recruitment and talent selection enables to rank job candidates and hence to recognize the top-scoring candidates. (Leong 2013) call this process as Resume Scorer and his process save recruiters time and effort significantly. In addition to these advancements, AI can help recruiters when it comes to sending out customized emails to possible job candidates about the current status of their job applications as well as scheduling interviews. Upadhyay and Khandelwal points out that previously repetitive tasks were conducted by human recruiters, but AI will make some of the recruitment processes obsolete. This in turn allows recruiters to delegate the repetitive tasks to AI systems and hence recruiters have more resources to put on strategic issues (Upadhyay & Khandelwal, 2018). When it comes to connecting to candidates, it can be stated that AI systems facilitate the communication between candidates and recruiters, because AI systems allows to contact candidates through the web, social channels and mobile platforms (Upadhyay & Khandelwal, 2018).

REVIEW OF IMPLEMENTATION OF AI IN HRM

Human Resource Management Enhanced with Artificial Intelligence

This section focuses on modern HRM processes that differ from traditional HRM by including AI technology. Now that the working environment is changing all the time and technology is evolving, HR functions need to evolve simultaneously. Traditional and previously used HR methods by themselves, which were discussed earlier, might not be as efficient today and they might serve better the older generations compared to millennials. Including AI technologies to the traditional methods improve them significantly. Article, "How artificial intelligence will change HR", discusses how the goal of AI-powered systems is to help HR to make decisions based on predictions done by the machine (Yano, 2017). All the data used in HR, for example, employee information, hiring records and salaries, are fed to the AI machine and it uses the information to make managing HR functions easier.

AI is used in HR for example in recruiting and selection processes, training current and new employees, evaluating their performance and, in some cases, satisfaction towards their jobs and the organisation. The usage of AI will help HR to cut person-hours in tasks that can now be completed by the machine. The gained time can be used to complete other important tasks, for example, interacting with job applicants, organising proper interviews, and answering their questions personally. AI has made their jobs run

more smoothly and effectively. Considering how fast the area of AI in HR is growing, it must provide a significant advantage to companies. The article, "Get intelligent in AI" suggests that some companies even might try to attract customers by overselling their usage of AI (Zielinski, 2017).

Especially when the talks of AI being taught to act human and have discussions, some people make the common mistake believing that AI will replace our jobs and do our work instead of us. This is not the case, AI cannot work without human input, meaning the data it needs for learning. Many jobs, like HR work, still need to be personal. According to an article published in Forbes, and written by Jeanne Meister in 2019, it has been predicted that AI will create more jobs than it will eliminate. AI technology will be eliminating some areas of work entirely. Technology has caused this to happen for centuries, but entirely new areas of work will be created simultaneously (Walch, 2019). The World Economic Forum says AI will take over 75 million out of current jobs, but it will help to create 133 million new jobs, and the intelligence of people skills will remain important alongside evolving technology (Meister, 2019).

Ben Eubanks mentions in his article for Workhuman five human qualities no machine can copy, and which should be valued even more in the future: Compassion, creativity, curiosity, collaboration, and critical thinking. These are qualities a machine could never learn, and which are and will remain valued in working life. Compassion and collaboration need emotions and the ability to interact with others on an emotional level, which a machine is unable to do because everything it knows comes from data that is fed to it by humans. Because the machine knows only the data, it cannot be curious and ask questions about things it is unaware of. Machine is incapable of critical thinking which most often needs emotional abilities, like thinking ethically, weighing different options, and recognising right from wrong. Therefore, it is also impossible for it to be creative when it lacks the mind of its own (Eubanks, 2019).

A company called Ideal, which supplies AI-based HR solutions for companies, has listed benefits AI has brought to the organisations that are using their AI-powered product (Figure 2). The companies have reported that their turnover has decreased by 35 per cent and that their business is performing better. They have also seen an increase in their revenue per employee (Ideal, 2019). Revenue per employee can be calculated by dividing the total revenue of the company by the number of its employees. Fig 2 shows the Benefits caused by AI to an organization

Figure 2. Benefits caused by AI in an organisation
(Source: Ideal, 2019)

Survey Recruitment and Selection

The largest area of HR where AI technology is currently being used is recruitment. In the recruitment and selection procedures, technology can help recruiters to find suitable candidates among possible thousands of applicants in a fraction of the time it has taken until now. The research study mentioned earlier in this paper (Rodney et al., 2019) shares the results on what the respondents of their survey feel are the most important recruitment duties. Well above 50 per cent feel it is important to invest in technologies that will improve the hiring process. The most important part with 72 per cent is candidate sourcing, so it is only natural to invest in technologies that will help make this process easier and more accurate.

The candidate screening process has so far been the most time-consuming task of HR. AI- powered computers can find the suitable candidates using the data it has been fed describing the perfect candidate for that particular job. According to an article on ideal.com, Ideal's own website, 52 per cent of recruiters have said that finding the right person among all of the candidates is the hardest part of recruiting (Ideal, 2019).

Peter Hogg mentions in his article wisely that recruiters should consider the potential of the candidates over their experience. Because the environment of work is changing, hiring methods should change as well to build diverse and innovative businesses (Hogg, 2019). This leaves room for AI to be improved, and stresses the importance of actual HR workers, who are capable to spot potential better than a machine.

According to the article "Impact of AI on recruitment," Ethan Lee writes how according to today's standards, applicant tracking system (ATS) is considered modest technology. By ATS he refers to the technology able to scan CVs and searching keywords (Lee, 2019). He mentions as a more advanced way to use AI technology in recruitment is via chatbots. There are many start-up companies concentrating to developing these bots that companies can use in their recruitment process. For example, a company called Gloat connects people searching for jobs with job opportunities using natural language when communicating with the possible candidates. Meaning, this chatbot will contact these people in their suitable platforms, chats with them and helps them find these open job opportunities which might have been hard to find or maybe otherwise been missed by the job seeker (Schroer, 2018). Using natural language means this bot is capable to interact with the person using spoken language, instead of code, and is capable to understand what the person communicates to it.

A start-up company named Paradox has created a chatbot powered by AI called "Olivia". Olivia helps candidates further in their application process, beyond learning about their skills and talent, and presents the job seekers next steps of the process, schedules interviews with them and answers any job-related questions the person might have. This service is used by some major companies like Delta, CVS Health and Staples (Schroer, 2018). The reason this is useful and good for the company, as well as the job seeker, is because the answers the machine provides to the questions related to the position, come from the company's data, which means they are useful to learn if the candidate should land an interview.

An article in Financial Times talks about how a business services company, Pitney Bowes, uses AI in their recruiting. Their AI-powered chatbot appears on their career's website, greets the possible candidates, and introduces their open positions to them in the area where the candidate is located. The chatbots walk them through the preselection process that includes questions related to the position. How the candidate will answer to those questions will determine whether he or she could be suitable for the open position (Jacobs, 2019).

The article on ideal.com also talks about the technology used in video interviews. The AI technology detects candidate's facial expressions, choice of words and how they speak during the interview and use this type of information to assess whether the candidate is suitable for the position (Ideal, 2019). Even though these expressions are visible to humans as well, sometimes they can be missed. It is possible that by detecting these micro-expressions, the computer with AI technology can help make better hiring decisions.

Using AI-powered job matching reduces the number of "hire lies", meaning hired candidates who have lied in order to get the job, or candidates who, even though having shown great interest, do not accept the position when offered or they leave the company soon after starting (Ideal, 2019). Recruiters and hiring managers seem to be keener to let the machine do the data- driven hiring decisions and listen to it rather than giving more weight to how they feel about the candidate and their suitability to the position (Lee, 2019).

Textio is a start-up that has produced an algorithm that recruiters can use to make the job descriptions less biased. In languages that use masculine and feminine words and pronouns, the job description can come across targeting the other gender. Sometimes the choice of words can cause the candidate back down from applying if the job post seems to be seeking one or the other gender, when it is not supposed to (Lee, 2019).

DBS Bank is one company that has created its own AI system which they use in their recruiting process. The system is called JIM, which is short for Job Intelligence Maestro, and JIM's task is to "hire 40 per cent more wealth managers while saving up to 40-man hours in a month". JIM will review candidates' resumes, provide pre-screening questions for them, collect their responses, and evaluate candidates' psychometric profiles by conducting assessments for them on this subject. According to the article published by DBS Bank, 20 per cent of their time recruiters spent collecting the previously mentioned information and emailing back and forth before having the possibility to meet the candidates. With the help of JIM more time can be spent on the interviews and they have a better chance to get to know the candidates better before the hiring. Therefore, also the candidates benefit from this faster selection process. In fact, by the time the article was written, nearly 100 applicants had provided feedback out of which 90 per cent has been positive (DBS, 2019).

Another interesting example of AI being used in recruiting comes from Unilever, an international company that recruits over 30,000 people and receives nearly 2 million applications over a year. Barnard Marr (2018) shares in his article a statement from Leena Nair, chief of HR at Unilever, which tells that around 70,000 person-hours have been cut due to the usage of AI. The company is collaborating with an AI recruitment specialist, Pymetrics. Together, these companies have created an online platform that the candidates can use on their mobile phones and computers (Marr, 2018).

The algorithm compares these candidates to previous employees via a selection of games which are designed to test their suitability for the job, logical thinking, and reasoning, and how they face risky situations. Next the candidates who move to the following stage are going to send a video interview which will be evaluated by a machine. Analysing the candidate's body language and processing natural language, the machine determines which candidates are most suitable for the position (Marr, 2018).

The vice president of Global Recruiting at Hilton, Sarah Smart, has told that their hiring speed has increased by 85 per cent after they have started using AI in their sourcing, screening, and interviewing processes. The time saved has therefore been huge and extremely valuable since recruiters can use more of their time on other important duties (Meister, 2019).

The article on Ideal's website mentions benefits that companies have experienced using the AI systems. As figure 3 shows, companies have been able to save up to 23 hours per hire and they have been able to reduce their "cost per screen" by 75 per cent (Figure 3). Cost per screen refers to the cost it takes to hire someone. This covers mostly the cost of personnel and since the AI has helped to reduce the needed workforce and working hours, it makes sense cost per screen has decreased. It also shows the HR employees have been able to work without unnecessary disruptions since the AI technology has been included into their jobs.

Figure 3. Benefits caused by AI to HR employee
(Source: Ideal, 2019)

AI has improved recruiting in many ways and in order to use AI and its benefits, it is clear that the candidates must enter their applications online in a certain format, so it is possible for the machine to evaluate it. In this case, applications which are done in paper form or face-to-face in person fall out of the AI's radar. Whether to see this as a positive or negative thing is to be decided by the recruiter.

Analysis of Training

When we consider corporate training, it is one area of HR where everyone is in a way treated equally. Everyone entering a new position receives similar training depending on which position they are starting. When a company decides to make changes in some policies everyone gets informed the same way. Only if someone is underperforming, they might have to go through more training relating to their responsibilities. But everyone is different and might have different learning tactics. HR workers need to understand how the workers learn most effectively, and which areas of improvement are important for the business.

This is where AI helps to make the decisions. Using the employee data, the machine can detect the areas the employee needs help with. AI algorithms can help to create learning programs customised to different people, who come from different cultures and different generations, have different education and working backgrounds and all in all different personalities and interests. This way the training and the learning experience can feel quite different when it is modified to suit the specific worker (Bathia, 2018).

This is useful since it is a fact that not all training methods suit everyone, and some might need to focus in some areas more than others. Customising trainings for different people will save HR's time since they do not have to organise multiple trainings for many people. Unnecessary trainings would be a waste of time of employees who could be working on other project during that time.

When the worker receives personalised training, they are unlikely to fall behind and are more able to avoid misunderstandings. After receiving the training, AI technology can follow the effects of it and determine whether the experience was useful. The programme can also offer the employees tests and quizzes to recap and measure how the training has worked. AI-based training makes it possible for the worker to stay connected to the work environment better than traditional training which might happen somewhere else. Staying in a familiar space, the trainee is more likely to focus on learning and can gather more information. AI is simultaneously teaching itself, improving the teaching material, and providing better material for learning. According to an article called "Future of AI in Corporate Training and Development" companies that use AI feel they are performing better and are more successful than their competitors that are not using AI (Pribanic, 2018).

In 2018, Docebo deputed their first learning platform that uses AI, machine learning, deep learning, and natural language. It is called Docebo 7.5. According to the company's CEO, Claudio Erba, they plan to automate the learning process entirely. He also estimated that within a year they will be using virtual coaches as well (Oesch, 2018). IBM is another one of the companies which has created an AI platform, Watson, which can identify the areas that need improvement and link which learning metrics to use to get the desired outcomes (Duindam, 2018).

Watson analyses a large amount of data in many different formats. This means it does not have to be fed data in a particular form and it is able to analyse different databases, files, and documents, like CVs, questionnaires, and emails. Based on this data the platform's dashboard will show important metrics describing current and probable future skill gaps, the satisfaction rate of the employees as well as return on investment (ROI). Based on these results it is possible to better understand what the employees need to succeed better or what kind of actions management should do (Duindam, 2018).

Virtual and augmented reality are also useful tools for companies to implement into their training programmes. When these technologies are combined with AI technology, it is possible to create scenarios suited just for a particular company and particular employee. This technology can be used when training people into their jobs. It is possible to create situations that are unlikely to happen in real life but are an important part of the training. The trainee can have exercises on situations that could happen in reality but avoid the pressure the real situation might bring. Other training situations might be when the current employees are introduced with some new procedures, for example, and they are this way able to practice these new habits in a secure way. With VR and AR technology it is therefore possible to include more areas into the training and let employees experience the training situations in what one might call a "risk-free" environment.

An article "Ten HR trends in the age of artificial intelligence" (Meister, 2019) mentions three company examples who have implemented AR/VR technologies into their training methods: Verizon, MasterCard, and Walmart. Verizon uses this technology to train their store managers on how they manage store protocol in cases like, for example, store robbery. They use the technology also on training new employees, educating them on new working ways and enhancing their communication skills and on how they can enhance their customer service skills (Lawson, 2018). This way, Verizon employees get to practise communicating with virtual customers and experiencing their replies without harming their real customers' experiences.

30

Walmart uses the technology to test their employees to see whom out of them has the potential to be promoted to manager. The test includes such steps as facing an angry shopper and calming them down, giving out tours in the store, etc. Like Verizon, this way Walmart employees learn how they should behave in these situations.

Walmart is also training its associates to manage the massive crowds they face during, for example, on Black Friday, when massive discounts occur. In case the workers have managed to avoid working during Black Friday in the past, they must be prepared for the possible chaos the day brings up. According to an article in the USA today the VR technology they use is provided to them by STRIVR (Tuchscherer, 2019). According to their website and where they list their customers STRIVR is collaborating also with other major companies, for example, BMW, JetBlue, Pepsi, already mentioned Verizon, and many more (STRIVR, 2019).

MasterCard uses VR technology on a wide range of trainings. Their employees receive this type of training in order for them to improve their soft skills and also prepare them to manage extreme crisis situations, like facing an active shooter in their workplace or how to get out of a building that is on fire (Meister, 2019). Every company should have fire training, no matter if it is done using VR or not but using this technology will help the workers to better understand how it might happen and how people in the building might react. This type of training can hopefully reduce any panic that might occur in a real-life situation.

Another way the AI can be used in corporate training is chatbots. As mentioned earlier in this paper, chatbots are used in the recruitment process and they are connecting job seekers with recruiters and open jobs. For example, "Rise of the Machines" talks about how they can also be used inside organisations, connecting employees to the company by giving them the opportunity to ask the chatbot questions related to the work and the company (Alonso, 2018). These chatbots are taught to answer possible questions employees might have, and therefore help to save the time of the trainers who do not have time to answer some of these enquiries personally and it leaves time for them to focus on other areas of their work. Also, when the employees can receive answers instantly, they feel more satisfied by being able to continue working without having to wait for the response for a long time. The machine can also gather these questions from the employees and the information can be used to improve the teaching materials. Reducing the amount of additional questions in the future, by including them into the training material in the first place.

Workers can help their employers to make the workplace better by evaluating their own experiences and giving feedback to those monitoring them. Feedback received straight from the employees can be used in management training, for the managers to better understand how their employees feel about their jobs and the management style of the company. By understanding how some managerial actions affect the employees, they can figure out if there are any better ways to manage a situation. The chatbots can also gather information on possible concerns from the employees which again can be used to educate the managers on how the employees are feeling and how to possibly improve themselves or the workplace (Eubanks, 2019).

Marr (2018) shares the example of Unilever in his article and explains how the company has implemented chatbots into their corporate training. Their bot is called "Unabot" and it is built on the framework of Microsoft's Bot. Moving on from just answering to HR questions, the bot is starting to answer to any employee questions. The interactions with the employees have taught the machine to answer day to day questions about the parking availability, shuttle bus schedules and enquiries about the annual salary (Marr, 2018).

PERFORMANCE MANAGEMENT

When evaluating the company's workers, managers have been forced to use just little information about the workers. Not because the information was not there, but because going through all that information might take too long, especially in larger firms with dozens, even hundreds of workers. This means some contributions of the employees might be left out of the count and therefore performance reviews remain inaccurate. This can cause employees to become demotivated and affect their productivity (Pawar, 2019).

According to the article "The Future of Performance Management" some research has shown only some organisations believe in their performance management process or how accurate and useful it is (Marr, 2017). According to a study conducted by Mercer only 2 per cent of companies consider their performance management to deliver "exceptional value". The same study states how 70 per cent say they must improve their way of managing performance (Mercer, 2019).

With AI it is possible and easier to gather information from multiple sources and have a better picture of the workers' performances. Since reviews can be done more easily, they are done more frequently and it is therefore possible for the assessments to be done in real time and it is easy to react with possible interactions with the workers, like in the form of trainings (Pawar, 2019). The previously mentioned Watson by IBM provides this type of information (Duindam, 2018).

When the performance reviews are done with the help of a machine, managers' personal feelings toward employees are left out, and therefore the common biases are eliminated from the review process. For example, biases related to race or gender (Pawar, 2019).

However, Bernard Marr mentions in his article how managers easily ignore performance review results if they do not match with their personal feelings about the worker. The machine cannot make a fair judgement since it lacks human emotions (Marr, 2017).

An article "Get intelligent with AI" mentions how AI technology can be used in organisations in order to spot workers with high potential talent and help them by suggesting appropriate learning courses (Zielinski, 2017). AI systems can provide actions to be done based on the performance reviews. It can mean more learning, larger compensation, promotion to another position or management training. Possibly there are workers fit for management training, possibly some workers show potential for other duties and might be good candidates for rotation. Rotation means when an employee moves from their department to work on other duties and therefore gains experience. This makes them a valuable worker for the company since they have the knowledge from different areas in the organisation.

Even though the company might use AI to evaluate the performance of their employees, workers must remember to keep a professional relationship with their managers as well. The machine simply suggests how to act according to the reviews, but in the end the managers decide will they act accordingly or use their gut feeling on whether the employee actually deserves to be promoted or even employed. Also, since the machine does not take into account

the employee's personality or willingness to learn, workers need to show these qualities to their managers in order for them to get to know the employee better and use that information as well when they are making decisions about them, according to Diane Gherson, quoted in "An Algorithm May Decide Your Next pay Raise" (Fisher, 2019).

EMPLOYEE MOTIVATION

All the above-mentioned ways AI improve HR practices and help to motivate the employees as well. When things run smoothly inside the organisation, the workers are more pleased with the company and satisfied with their jobs. AI naturally does not offer monetary motivators itself, but intangible benefits.

As AI helps to reduce HR managers' workload, it does the same for other business areas as well. By including AI into the company's systems, all the employees benefit from it one way or the other, but mostly because AI makes the work a little bit easier and less time consuming on certain areas.

As mentioned in the earlier chapters, AI can customise operations in the workplace. It can early on detect potential candidates for promotions or other rewards. When the potential of an employee is noticed and they are offered a chance to move ahead in their career inside the company, the employees' motivation towards their job must increase. This is beneficial for the company since satisfied employees are more likely to stay there. Same as with clients, it is more beneficial to have long term employees, so the company does not have to use resources so often on recruiting mew employees to replace the old ones.

Similarly, the technology can point out those needing more attention or help. These employees might be underperforming, or they might be feeling disconnected from their current job. When these workers get support and extra training their motivation working for that company can also increase. Rather than terminating employee's contracts or letting them underperform a long time, it is more beneficial to offer them support early on, this way the employee feels themselves appreciated even without pay raise or promotions.

At Hitachi, managers have conducted surveys among workers to figure out what motivates them and what makes them more productive and find out how satisfied are the workers in their current roles. Hitachi employees from different divisions of the company took part in the monitoring process and wore label sensors throughout the testing period. 2063 people outside Hitachi took part in this survey during September 2017 and next month an in-house trial took place including 2,335 Hitachi staff. Next year also 252 workers from HR staff took part in this survey. The goal was to monitor which activities increased employees' happiness and therefore satisfaction.

With this information, the AI powered machine was able to detect when some employees' satisfaction was decreasing and suggested them activities that could increase their happiness via their smart phones. (Hitachi, 2019)

WHY AI IS NEEDED IN HRM

The Application of AI in Recruitment

The following section will describe in what part of the organization AI software are implemented in the organizations interviewed. Overall, many of the interviewees agreed that even though AI is an interesting new technology, it has a long way to go before it could be perfectly implemented strategically.

Pre-Screening and Pre-Selection

It was found that six out of eight professionals actively use AI software in the pre-screening and pre-selection process of their recruitment process. In the pre-screening part for the companies, AI technology

bases itself on the job descriptions provided by the company and screens for possible job candidates. This is conducted by not just applying certain keywords, but also through language and other traits used in the applicant's submissions. The prescreening for four of the professionals was said to most often take place through social media channels such as LinkedIn or Facebook. The rest of the professionals said that the screening was conducted on applications sent in directly on a job posting. Some software also does prescreening by applying personality tests. The personality tests are applied to see if the candidate has the right qualities and skills which the job requires.

In terms of pre-selection, it was discussed that AI helps give an organization all the necessary information to select candidates that seems the most fit. One professional described the process as the technology putting together a long list ranking the best fit candidates for a job vacancy. This then helps the company get a basic understanding of what the AI software feel, based on all data collected to evaluate who would actually be the best fit employee. From this, the organization itself gets to select the candidate which they wish to hire. They can either pick from the top ten candidates provided by the AI software or choose freely who of the candidates put forward they want to hire. An important focus was put here by one professional, who said that the AI software learns from the way you pick candidates. If you constantly would pick from the top 10, the AI software will learn that these are the type of people you want and therefore eliminate others who might be eligible for the job as well.

AI Promotes Communication with Candidates

All eight professionals said that they actively used AI software to communicate with the candidates who apply to their open positions. Some of the professionals used similar type of AI software when communicating but for some it differed. Some companies' software had chat bots which took the candidates information such as name, previous job experience and similar data. This was then converted into a CV and a job application which the AI software later would screen through. The chat bot has a continuous interaction with the job applicant, where the applicant can get updates and ask the chatbot questions. The AI software know itself how long time it has gone since the job applicant applied to the job and check in to see how the candidate is doing and if any questions has arisen regarding the position.

Many of the professionals said that the AI software can give each candidate an overview when a recruitment process has been finished of what qualities the candidate had or what it was lacking in relation to the job posting. It can in detail explain why the person did not get the job. It also allows for the job applicant to ask questions if they would still be unsure why they were not chosen.

BENEFITS OF USING AI IN RECRUITMENT

Majority of the professionals agreed that AI benefits recruiters when it comes to cutting down routine and administrative tasks. Hence recruiters have more time to focus on the best matches.

The use of AI in recruitment help recruiters especially in the evaluation, ranking and qualification processes of job applicants and hence it is possible for recruiters to start the recruitment process with the most potential job candidates directly by interviewing them. When it comes to communication between recruiters and job applicants, many of the professionals would not mind whether the communications happen through human or AI based robot. It was also mentioned that AI allows more equal chance to all candidates for being selected for the job due to decreased human bias. Two of the eight professionals

34

adduced that with the help of AI it is possible to find and notice both potentially silent job candidates and excellent job candidates. An important issue that two of the professionals brought up was the real need and benefit of the use of AI for the company. Hence it is crucial for the companies to consider the real effectiveness brought by AI to the organizations and ponder how the use of AI in recruitment affects company's effectiveness.

CONCLUSION

Economic studies emphasized, there is an urgent need to embrace the human resources with regard to the impact of artificial intelligence and automation. As there is a significant impact on the facilities and their work that support the digitization of human resources, and human resources workers must be fully prepared to support the digital transformation within their facilities, otherwise the human resources would be at risk lagging and seeing other departments. There is a great opportunity for human resources to align with the facility and add great value by becoming digital and databased. We hope to see facilities in our beloved kingdom in the coming years support the digitization of human resources and see how effective its transformation is (Bendick, M. & Nunes, A. 2012; Bibi, P., Pangil, F., & Johari, J. 2016). The current study describes the impact of artificial intelligence on human resources and presents a perspective on this topic. It also addresses how the AI can help to improve the imagination of a transformation and design a new applications experience. After conducting the overview of existing opportunities and possibilities, the main conclusion is clear. AI plays a vital role to shift the HR functions to enter the digital era. Without a doubt the increased use of technology the information within the organization has radically changed the types of business and skills you need some activities, such as training, development and organization, will be increasingly important to adapt to these changes have occurred inside with certain activities and employees may be dispensed especially owners simple skills and routine work. Therefore, the HR should have basic information established based on computer services to overcome the challenge that most large organizations nowadays facing and increase their ability to provide valuable information to management to make informed decisions about human resources. If organizations wish to remain competitive in today's global economy, they will need to look at ways to incorporate conversational AI for HR transactions in their decision-making process. Organizations should rely on AI to perform administrative duties so that HR departments may become more efficient. HR professionals will be able to focus more on strategic planning on an organizational level (Bondarouk, T., & Brewster, C. 2016). The Gulf Countries with the implementation of Vision 2030, the public sector has a great opportunity to keep up with the digital transformation. Given the IT facilities in business management, this has led to a change in the composition of the workforce within the organization. It lets women and men have competed in many jobs, and this will place a new burden on human resources management as a result of the demand for gender equality, this also allows for the great integration of the feminist element. This requires senior management to prepare their plans (sponsorship), so the HR department should be ready to respond to the employment of the opposite gender. Employees will be affected by the AI function in multiple ways, so it is important to focus on employee needs and possible outcomes. However, the adoption of AI in human resource functions can help in reducing the amount of time HR professionals spend on administrative tasks, reducing the burden of shared service centers and help desks by performing HR transactions and providing answers for routine queries, recruiting and retention and measuring ROI.

LIMITATION

Since the application of AI in recruitment is relatively new and low especially in Gulf countries, there is a limited availability of companies implementing AI in their recruitment process or developing AI recruiting software. This makes it hard to gather an extensive research, since majority of the companies use AI only to some extent in their recruitment process. Even AI as a topic has been researched lengthy, without a sufficient amount of companies that use AI proper in their recruitment, it limits to explore the real effectiveness and implications that AI entails. In order to make this study applicable, the amounts of interviewees could be higher. However, similarities and differences from the interviewees' responses could be drawn.

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36

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Chapter 3
Evaluation of Financial Inclusion in the Villages of India:
Qualitative Research – Grounded Theory Approach: Precursor to Digital Gaon

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ABSTRACT

Financial inclusion refers to making financial services available at the doorsteps of the citizens of India. There has been a lot of research to identify the various factors that lead to the adoption of technology for banking and availing of financial services. But there is no study on the factors that impact the adoption of technology and formal banking services in India. A large section of the population in India still uses the informal banking channel such as money lender, relatives which leads to difficulties in availing the financial services. Qualitative research and that grounded theory have been used for research. Direct interview has been used to collect data from the participants across 11 different villages. The study highlights that the level of financial and digital literacy has improved in India though the Kisan credit card scheme faces various problems in implementation.

INTRODUCTION

According to the Rangarajan Committee, NABARD, Financial Inclusion is the key to Employment, Empowerment, and Education & Entrepreneurship. Valverde et al., (2007), in their research paper, have highlighted the relationship between Financial Inclusion and economic growth. The Digital village sche me was launched by the Honorable Prime Minister Sh. Narendra Modi in 2020. Through various Public-Private Partnerships, the Government of India aims to transform Indian villages through Mission Mode projects such as Common Service Centers, telecentres aimed at delivery of citizen-centric

services at the doorsteps of the people. Besides, citizen-centric services, access to various Government schemes will be provided through CSC (Common Services Centre) localized service delivery system. CSC (Common Services Centre) will be nodal agencies to deliver services and provide resolution to most of the problems of the villagers. This research study aims at identifying various Supply side factors that impact Financial Inclusion in Rural India. Within Interpretevist paradigm, through the Epistemological stance of Social Construction and Phenomenology, this study aims at understanding the root causes for the existing lacunae in implementation of the Financial Inclusion in Rural India. Qualitative method of Grounded Theory through the Direct Interviews with the village heads have been used for the purpose of study. The problem of financial exclusion is multidimensional. Formal financial institutions do not find it viable to lend to the micro borrowers who lack collateral and information asymmetry, (Patnaik, 2020). Besides that, Demirgüç-Kunt et al., (2017), in their study, cited that the problem of Financial Inclusion is the problem of lack of access, affordability, inequity, and social deprivation. Solo, (2008) in their research paper emphasizes that the high cost of banking, mistrust, complex documentation and banking issues are the main reasons for Financial Exclusion. Devlin, (2005), Kempson & Whyley, (1999) in their research paper have further elaborated on the causes of Financial Exclusion as Refusal by Banks, Conditional Exclusion such as identity requirements, cost of banking, Physical Exclusion, Cultural Exclusion, Social Exclusion, Psychological Exclusion. Shetty & Rai, Sona, (2001) in their research paper discuss the problem of information asymmetry, moral hazard, and adverse selection for failure in of Financial Inclusion program. This study will contribute to existing knowledge within the domain of micro reasons for the failure of various Government schemes.

BACKGROUND

The government emphasizes a strong need to educate and digitally empower the villagers which contributes to the development of the economy. This study is aimed at analyzing the various root causes of Financial Exclusion in the villages of India. Solo, (2008) in his research study has highlighted the importance of understanding the level of financial inclusion in the rural communities of India. Cnaan et al., (2012) in the research paper have highlighted various factors impacting inclusion. Despite all efforts, there is a lack of comprehensive study that provides a comprehensive account of reasons for financial exclusion in Indian villages.

MAIN FOCUS OF CHAPTER

Research Question

The major research questions are:

1. What are the awareness levels, about channels of banking such as Mobiles, Internet, and Branch & Common Services Centre in villages of India?
2. What is the level of awareness of the various Government schemes such as Kisan Credit Card (Microfinance), Pradhan Mantri Jan Dhan Yojana, Pradhan Mantri Fasal Bima Yojana, in villages of India?

3. What is the level of access to financial services (Including Financial Technology) in villages of India?
4. What are the obstacles in the implementation of Digital & Financial inclusion schemes in India?
5. What are the characteristics of those who are financially excluded?
6. What is the role of Self-Help Group and Microfinance in the development of India?

OBJECTIVES OF THE STUDY

The aim of the study is to analyze the various factors that impact the Financial Inclusion program in Rural India. This research study will identify the various challenges to the implementation of the Kisan Credit Card scheme in India.

LITERATURE REVIEW

(Accion International, 2010) is to describe Financial Inclusion as a state in which all those who can use the technology have access to the technology, at convenient and affordable prices, in a convenient manner with dignity. (Allen et al., 2016) in their research study have defined Financial Inclusion as use of the Formal Accounts (Banerjee et al., 2015), is a random evaluation of the Microcredit program in Hyderabad by the Spandana Microfinance. The study establishes that despite a high Marginal rate of return, most households do not avail of Microcredit due to the high Marginal Rate of Interest. (Bagli, 2017), in their research paper have tried to find out the impact of various factors on Financial Inclusion. (Cnaan et al., 2012), is a descriptive study on various factors that impact the access to financial services in the village of Tamil Nadu, South India. (Chakravarty & Pal, 2013) in research paper have discussed the role of Financial Inclusion in promoting financial growth and development. The paper aims at finding out the impact of economic growth on Financial Inclusion. (Demetriades & Law, 2006), the study establishes that Financial Intermediation has a positive impact on the economic growth of the country (Robert et al., 2014) in their paper highlight that access to the use of Formal financial services positively impacts the level of self-employment, household consumption, and wellbeing. (Vincent & Sivakumar, 2019), have highlighted the importance of Financial Inclusion in promoting equity. The research paper highlights the importance of the Social Banking program and access to various social programs on Financial Inclusion in India. Various studies highlight supply factors of financial inclusion which include factors such as a perceptual shift in the adoption of different channels, condition exclusion which includes a requirement for physical collateral and financial literacy, situation exclusion which includes the distance from the banks and other channels of delivery of financial services. Besides, that there are many demand factors of financial exclusion which include the factors such as information asymmetry, financial literacy, the ticket size of loans, and frequency of loans to name a few, (Whyley, July 2000). Financial literacy has been identified as the major factor impacting financial inclusion and this construct of financial literacy has been defined as knowledge to manage finances in financial decision making, (Volpe, 1998). Lack of financial literacy leads to a problem with debts, high credit costs, and less progressive financial planning, (Mitchell, 2007). The financial system in any nation comprises of the demand and the supply factors and there are large institutional gaps within the financial system, (Ledgerwood, 1998). One of the major developmental agendas in many nations is financial inclusion. As per the literature by (Pais, 2010) the

main factors impacting financial inclusion are urbanization, income, illiteracy, and level of urbanization. Financial inclusion helps in reducing the dependence on informal channels of money such as money lenders and other traditional modes such as loans from relatives and friends. As per the extant literature Financial inclusion has been defined as access to the services at the doorstep of the citizens of India, (Committee, Rangarajan, 2008). Most of the literature highlights the importance of physical access to financial services which include the distance from the banks, ATMs, and usage.

Digital village has been identified as the strategy for the future, whereby all the citizen services are to be provided through digital mode, i.e., through Common Services Centre (CSC) where all the services such as the provision of education services such as scholarships for the rural students, provision of records of attendance for the rural students online, access to Machine learning and use of computers for creating word documents and pursuing IT vocation, use of various e-Governance applications and e-learning courses for training and capacity building are some of the courses and modules of digitization program.

Also, the Government is providing (Aleksandar Manasijević, 2019) and other ICT (Information Communication Technology) based methods. The Digital village program is aimed at creating vocation among the rural youth and to give impetus to the local craftsmanship and group employment through entrepreneurship. Group lending has emerged as another area to resolve. the issue of information asymmetry and physical collateral, through Social Capital and social collateral, (Khushboo Deepak Kumar Bhatt et.al, 2021). Rural e Markets are the new initiatives that can set the trajectory for economic growth, (Aleksandar Manasijević, 2019). The importance of transforming the villages from connected to engage mode, (Development, 2010) has been discussed by the extant literature available in domain of digital literacy.

AI (ARTIFICIAL INTELLIGENCE IN RURAL BANKING)

Artificial Intelligence is defined as a sequence of methods, systems, technologies that facilitate intelligent management of human behavior by analyzing the environment, towards the achievement of the goals and objectives, (Gopalakrishnan, 2020). Mobile banking applications have emerged as the major tools for Artificial Intelligence in Rural Banking in India. Mobile phones enable banking in any corner of the world from distance. It enables fast transactions, reducing the geographic barriers and bank operation time, (Khalaf, 2020). One of the major issues in rural banking is the lack of information about the creditworthiness of rural clients. By use of digitizing record keeping, risk management of the credit loans, customer service, and customer engagement credit history can be generated for the customers. This information helps in improving credit decision-making and risk management. Digitization also helps in reducing the costs of business and risk management. In Akodara village, the villagers are using the USSD (Unstructured Supplementary Services Limited) based applications through Mobile, for the purpose of making retail payments. From the extant literature, it becomes clear that the use of Mobile Applications, USSD (Unstructured Supplementary Services Limited) payment applications, Merchant based payment systems are to be used for the purpose of m-Commerce.

THEORETICAL LENS

For the further analysis of the literature, the theoretical lens that has been used is Stakeholder theory, which provides the relationship between various stakeholders. Different stakeholders included in the study are the regulators of the Reserve bank of India, the farmers, the Government, the bankers, investors, the Ministry of Corporate Affairs, and Niti Aayog and in brief, the ecosystem includes banking and finance ecosystem. Overall, the nature of technologies depends on the stakeholder and the nature of the agents. Most Commercial banks use Artificial Intelligence (AI) for Customer service, front-end, and back-end tasks. Artificial Intelligence, is also being used by the agents in the financial markets including private equity funds, agriculture brokers, markets, and regulatory bodies like the Department of Agricultural markets. Artificial Intelligence (AI) is being used by supervisory bodies in order to improve the Customer Interface and also detecting frauds. Similarly, for the purpose of rural banking, Voice-based technologies are being used, this also includes the use of Credit Scoring and reduces the risk of defaults.

METHODOLOGY

This research study has used the Qualitative method of doing research. Rural Financial Inclusion is a social construct and hence within the Social Construction paradigm, the reality is socially constructed. Much contrary to the Positivist grounds of knowledge, within the Naturalistic settings of Indian villages, Phenomenological epistemological stance refers to the understanding of the social processes through which people in Rural India concretize the reality. In this broad conceptual framework, based on typology suggested by Burrell & Morgan, Phenomenology is the main research paradigm. The inductive approach is used to derive generalization from the specific observations and research method used in Grounded Theory and data was collected using Qualitative approach gathering, interview, observation, and questionnaires. Data analysis was done using open coding, Axial & Selective coding.

RESEARCH APPROACH

The research approach used is Phenomenological which defines reality as a projection of individual consciousness and as an act of creative imagination. It is based on assumption that human beings are transcendental & intentional beings that direct the psychic energy & experience that helps to constitute the meaningful world. The research is conducted within the Naturalistic settings of the Digital village. Triangulation approach was used for collecting data using in-depth interviews with the village heads, surveys in select villages, and digital media. This approach helps to ensure the reliability of data. Due to empirical inductivism, the data is collected from the ground.

Method in Qualitative Research

To study the social phenomenon Qualitative approach has been used. (Field, 1995). The research method is Grounded Theory and deploys the technique of detailed interviews with the village heads and Sarpanch regarding the digital & financial inclusion program.

Inductive Approach

To study and understand the social problem of financial exclusion inductive approach (Popper) was used. The data generated from the ground is used to generate theory. For study 11 (Interviews for 7 are mentioned in the study), village heads were interviewed and data collected was used for analysis.

Research Strategy

Within the Phenomenological paradigm, the Grounded Theory approach is used that combines data collection, coding (Open, Selective & Axial), and data analysis. Data is collected through personal interviews. Within the natural settings of Indian villages, a contextual study provides an insight into the challenges and problems in implementing Financial Inclusion in Indian villages

Unit of Analysis: For the purpose of research, Unit of Analysis for interview is Village Head

Participant Selection: Village Heads Sarpanch, Pradhan, and local heads are selected for interview. Participants are chosen because these leaders are the Change Agents in the Indian villages. Their involvement ensures the reliability, credibility of the research.

Interview Instrument

To gather information from the villagers, the open ended questionnaire was used. The questions are further divided into three parts. The first part of the study pertains to the level of awareness of the villagers about the access and usage of various National schemes and the method of applying for these schemes. The second set of questions related to access to physical banking infrastructures such as bank branches and ATMs. The last set of questions about the implementation of various focus schemes such as Kisan Credit Card, Pradhan Mantri Fasal Bima Yojana, and inclusion of the marginalized section of society such as women and children. The set of questions selected were open-ended and neither the questioning sequence of questions was exact.

Developing Interview Questions

Theoretical Sensitivity towards sociological concepts such as Financial Inclusion, Digitization, Empowerment, and Financial Literacy was generated through the first set of pre-study in Chelanur village, Kozhikode, and previous studies in Jhattipur village, Panipat, Haryana, Surakhpur village, New Delhi, and Akodara Village, Gujarat, India. Interactions with the Sarpanch Sh Ashok Kumar Jhattipur, Panipat, India, and other village leaders across different villages in the state of Uttar Pradesh, Haryana, Gujarat it was realized that the villagers have a very optimistic view regarding the adoption of technology for availing financial services but they were very disappointed with the implementation of schemes, lack of access to the technology and banking services and presence of middlemen and commission agents in various Universal National schemes like Kisan Credit Cards and Pradhan Mantri Fasal Bima Yojana. From the empirical analysis of how the sociological concept of Financial Inclusion works in the context of Indian villages a general Theoretical Sensitivity in terms of concepts such as financial literacy, distribution policy, women empowerment through community initiatives such as Self-Help Groups, intermediation & presence of commission agents, regulations were translated into research questions.

DATA COLLECTION AND ANALYSIS

Data Collection

Phase 1

A partial framework of local concepts relevant to Financial & Digital Inclusion in Indian villages was developed through the preliminary survey of the Chelanur village, Kozhikode India, and previous visits to Akodara village, Gujarat, Jhattipur, Panipat, Haryana, and Surakhpur, New Delhi. After the preliminary phase, data for Qualitative Research was collected through the interviews with the Sarpanch and Village Heads in 11 different villages in Uttar Pradesh and Madhya Pradesh. In the first week, interviews were conducted in Sarda Village, Gujarat, India, Akodara Village, Gujarat, and Agariya Village in the Bhopal district of Madhya Pradesh and Bangsariya village, district Bhopal, Hujur Taluk, and Madhya Pradesh, India. From this Phase, the concepts of Digital Literacy, Financial Access to the various financial services, financial awareness about various Government schemes such as Kisan Credit Card, Pradhan Mantri Fasal Bima Yojana, Financial Exclusion due to presence of middlemen and Government and Bank failures, Empowerment through Microfinance and Self-Help Groups and Financial Inclusion through various National programs like e Markets, Sarv Shiksha Abhiyaan and Digital Gaon. Regarding Theoretical sensitivity, the references were given from the literature. Physical Access to financial services through Bank Branches and ATMs is a problem in all the villages and all of them also suffer from Conditional Access problems about the Banker's denial and difficult documentation processes to avail of a Universal scheme like Kisan Credit Card.

Phase 2

Theoretical Sampling and Saturation

In light of concepts identified in Phase I, Phase II of the study was planned across much for a divergent set of villages in terms of digital and financial access in villages of Uttar Pradesh. For Theoretical Sampling, the selection of the villages & stakeholders was done through literature review to facilitate Constant comparison. Data Collection was an iterative process and was continued till theoretical saturation was achieved. 11 interviews (5 of which are mentioned) with transcripts were continued and categories and subcategories were identified till the new categories stopped emerging. Data Collection, analysis, and theory development were undertaken simultaneously.

Scope of Population and Conceptual Relevance

For the study, the scope of the Population for collecting data was the Sarpanch, Pradhan, and Bankers in the villages of India. The selection of villages and people to be interviewed was done to facilitate a simple comparison among different groups of the same nature but of different sizes in terms of population, financial inclusion, and geography. Based on the extant literature available in the field of Financial Inclusion, Comparative Analysis through studies across the demographically and geographically diverse villages of Uttar Pradesh and Nepal helped to increase the generality & scope of the substantive theory. To facilitate comparison, the villages selected differed on the level of digitization & capacity building.

45

Slices of Data and Depth of Data

For the Qualitative study two slices of data, the Questionnaire Survey & field study were used. Overall a triangulation approach was used to collect data from various sources such as social media, studies and published material in the field of Financial Inclusion. With the diverse set of data, the research was conducted to facilitate the emergence of substantive theory.

DATA ANALYSIS

The method of analysis used for theory was *the Constant Comparison* method of analysis. To convert the Qualitative data into a quantifiable form, coding of data was done using Open Coding, Selective coding, and Axial coding approach. Data that was collected through the interviews were transcribed and further, each incident was coded. This led to the emergence of the properties and categories.

Memo Writing and Open Coding

(Corbin, 1998) has suggested a three-stage process which is comprised of Open Coding, Axial Coding & Selective Coding. This study makes use of the 3-stage process for analysis. In the first stage of Coding, several iterations were undertaken to identify the keywords and develop codes from these Key Words. Theoretical comparison is done by using different sets of data. Regarding the concept of Financial Literacy and Financial Inclusion, the theoretical comparison is made between different kinds of the village such as Tribal villages and Rural villages in India.

Theoretical

Table 1. Interview transcript 1

Questions	Open Coding	Axial Coding
Q. Do you think there are benefits of digitization & do people in your village know how to transact online? As a village head I do not think there are benefits of digitization **("Negative Experience")**. But thinking otherwise yes it saves time and costs **("Time & Cost Savings")**. Villagers need not go anywhere as all the benefits of banking are available through online mode **("Digital Access")**.	Dividends of Financial Inclusion. Digital Access at door step	**1) Access** **2) Benefits**
Q. Are there any bank branches in your village? No, there is no bank branch in our village **("Physical Access")**. There is a bank branch in Akodara that is 1.5 Kms away from our village. One can use mobile & internet technology for banking and hence there is no need to go to the bank **("Digital & Financial Inclusion")**	Physical Access, Digital Inclusion	**Access**
Q. Do people in your village know how to use ATMs (Automated Teller Machines), Mobile for banking? Yes, people in village do know how to use mobile technology for banking **("Usage")**. Approximately, 10% do not know how to use mobile for banking but 90% people do know how to use technology for banking **("Usage")**. Women face lot of challenges in using mobile and online channel for banking **("Challenges to use technology")**	Usage, Challenges to Technology	**Usage**

46

Table 1. Continued

Questions	Open Coding	Axial Coding
Q. Has any training been conducted in your village by any bank? Do you want bank to conduct any training in your village? There are no frequent trainings conducted in our village, but one training was conducted in the past by the Sabarkantha bank, about the use of ATM Cards (**"Trainings"**). But we definitely want more training. Please conduct one training in our village on Financial Inclusion	Financial Awareness, Financial Literacy, Financial Trainings	**Usage**
Q. Government has conducted so many trainings regarding scheme such as Pradhan Mantri Nidhi Samman Yojana, Pradhan Mantri Fasal Bima Yojana, and Pradhan Mantri Jan Dhan Yojana. Are villagers aware about these schemes? Yes, the villagers are aware about these schemes, the Vice Chairman of Panchayat committee provides the information about these schemes to us. (**"Awareness"**)	National Schemes, Information Dissemination, Financial Literacy & Awareness	**Usage & Information Dissemination**
Q. Do farmers in your village know about Kisan Credit Card? And do they know now they can withdraw money from ATM using KCC Yes farmers do have Kisan Credit Card (**"Access"**) and there is lot of fraud in mobiles these days. There is fraud (**"Cyber Fraud"**) for cash and project is regarding the same. Things are shared without our knowledge and we have used Google Pay (**"Payment Banks"**). Fraudsters ask for number and a person called me some time back and I am abused him.	Kisan Credit Card, Cyber Fraud, Formal Finance, Financial Access, Payment Banks	**Usage & Access**
Q. In your village how many people borrow from the Money Lenders? No one, in our village borrows money from the Money Lender (**"Informal Lending"**). In our village everyone borrows from the Bank and other formal channels.	Informal Finance	**Usage**
Q. KCC provides loan even to the Marginal farmer. How many farmers are small farmers? In our village all the farmers are the small farmers. Yes even I am a small farmer and my land size (**"Conditional Exclusion"**) is 10 to 15 big has. All are small farmers in our village.	Marginal Farmer, Conditional Exclusion	**Access**
Q. In village the Government has started many schemes as Government wants to give push to farmers, who contribute most to the National development? There is a scheme Fasal Bima Yojana, how many farmers have access to this scheme? Government wants that the farmers income should increase by 2021. Government wants to create awareness regarding all the schemes among the farmers. This scheme is not successful (**"Voluntary Exclusion"**). Many farmers took the insurance, premia amount was deducted, but the claim was not processed. Insurance companies are doing fraud as Insurance premia is automatically deducted from the Kisan Credit Card. I had implanted the peanuts, but the crop got destroyed. Farmers face serious issues. For one of my farmer friend, his cotton crop was destroyed but nothing was given to him. He has an account with Dena Bank (**"Bank Failure, Complex Documentation"**). As farmers go to the bank for their insurance claim, the bank tells them, your insurance must be of 2019 & claim that is processed is of 2018, so you won't get anything. They use tactics and send us back. What banks do is they deduct amount in one year and does not in another year. As if the farmer won't know anything and at the time of renewal farmer realizes that the premia is not deducted. Our request is that banks should inform us when they are not deducting the insurance premia amount (**"Information Asymmetry"**). Firstly, they should inform the farmer whether they are deducting the insurance premia amount or not. Moreover, they should always deduct the amount and this will benefit all the farmers. In August, 2020 they deducted the amount and they did not deduct the amount in 2019. They do not give claim saying that premia was not deducted. Every year the premium amount should be deducted by the banks. Instead, the bankers use tactic and make us run from the pillar to post	Voluntary Exclusion, Bank Failure, Complex Documentation, Information Dissemination	**Access**
Q. Did you complain about the same and where? Where do we complain as a farmer we will have to complain at the bank only? This is a problem (**"Grievance Redressal"**)	Farmer Grievance Redressal	**Access**

Sample Memo Number 1: Sadra Village

Figure 1. Sadra village memo
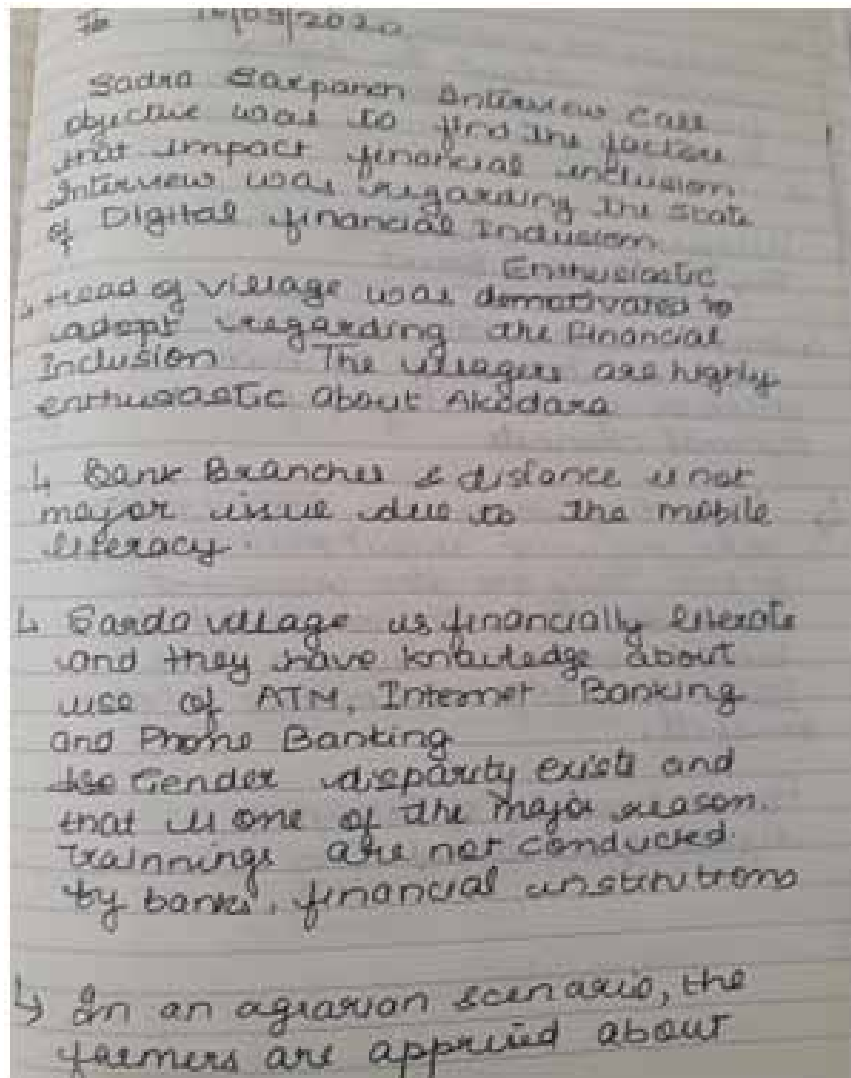
Memos: Memos clarify that Sadra village; Gujarat is a developed village with access to finance. Kisan Credit Cards and Crop Insurance are one of the major issues. There is a branch at 1.5 Km in Akodara and villagers want Financial Training. There are complains about Mobile Frauds and Bankers attitude.

Memos: Mainly distance from bank and lack of ATMs, Financial Literacy are the major reason for lack of Financial Inclusion. Due to the complex Bank procedures in Kisan Credit Card and Insurance, the farmers do not receive the benefits of Financial Inclusion. Adoption of technology by women is a function of the age.

48

Table 2. Agariya village (tribal village)

	Open Coding	
Q. Has digitization been done in your village? Yes Digitization has taken place and villagers know how to use technology. However, not all of them know majority can use technology for availing financial services (**"Digital Literacy"**)	Financial Literacy, Digital Literacy, Usage	**Usage**
Q.2 What percentage of people are able to bank through Mobile & Internet Banking? You can assume that 20% of the people can use technology & are able to transact through Mobiles and Internet. (**"Usage"**)	Financial Usage, Financial Literacy & trainings	**Usage**
Q. Has any trainings been conducted by NABARD or RBI regarding Financial Inclusion in your village? As on date no training or such programme has been undertaken. None of the programmes have been undertaken till date. (**"Training"**)	Financial Awareness, Financial Literacy, Financial Access	**Access**
Q. RBI has undertaken many schemes such as Kisan Credit Card and Pradhan Mantri Fasal Bima Yojana? Yes farmers have undertaken Pradhan Mantri Fasal Bima Yojana from the Agricultural societies and Banks. Farmers do have access to the Kisan Credit Card scheme. (**"Financial Access"**)	Financial Access	**Access**
Q. I did an interview in Sarda Village, Gujarat and what thing came across was that despite deduction of Insurance Premium from the bank, farmers did not get any compensation from the bank for Crop that got destroyed because of the weather conditions or other Natural reasons? Yes there are problems. Farmers do not get compensation but the Premium gets deducted regularly. Yes farmers face problem. In 2018-19 the crop was destroyed but farmers did not get any compensation. Information was provided by the Patwari, or Officer or banker who deducts the amount for insurance but the amount not provided to the farmers. (**"Bank Failure, Complex Documentation"**) *Yes the same thing was told by the villagers in Sarda Village?* Yes the amount has not been credited	Conditional Exclusion, Information Asymmetrery, Agency Problem, Adverse selection, Presence of brokers & corruption in India	**Access**
Q. Do all the farmers have the Kisan Credit Card? Yes all the regular farmers have KCC. Approximately, 90% of the farmers have Kisan Credit Card. Some have KCC (Kisan Credit Card) in which overdraft is overdue. Many people are defaulters in this scheme. (**"Access"**)	Lack of access to financial services such as Kisan Credit Card	**Access**
Q. Has RBI conducted any kind of training to inform the farmers about Kisan Credit Card? No trainings have been conducted as on date (**"Trainings"**)	Financial Awareness, Usage	**Usage**
Q. In regard to access, how many branches of bank are there in your village? Village has no bank branch. All are on Mandir Road, Bhopal Jila Road, 2 Banks UCO Bank & Shastri Grameen Bank (**"Physical Access"**)	Financial Access, Physical Access	**Access**
Q. What use to happen earlier was that if we go to the interior of the village, people use to borrow money from the Money Lenders or against collateral from the informal source? Are there any such farmers who have borrowed from the Informal sources? Yes there are farmers who borrow money from the informal sources and Money Lenders (**"Informal Lending"**) at an extremely high rate of interest. There are more people who borrow as compared to people who are lending the money. But still there are at least 10% of the farmers who borrow from the Merchants	Informal Banking, Financial Inclusion	**Access**
Q. What percentage of Women in your village are literate and have knowledge about the use of the ATMs and the use of internet banking & what is bank? Let's see women who are in age group of 0 to 25 years are women and are aware and literate and 50% of the women villagers in age group 30 to 50 years and 15% who are in the age group above 50 years. New generation is literate and has knowledge about the mobile, internet. Younger women have knowledge that the digitization has taken place (**"Financial Literacy", "Digital Literacy"**)	Women Empowerment, Demographic Factor, Usage, Demographic Divide, Voluntary Exclusion	**Usage by Marginalized Section**

49

Table 2. Continued

	Open Coding	
Q. The Government has started many other schemes such as Free Education for children up to 14 years of age and free mid day meal scheme in schools. Do villagers know about these schemes? Not all people are sending their children to the schools under Sarv Shiksha Abhiyaan. Some people do not have knowledge. Few who send their children to school their children get meals (**"Financial Literacy"**)	Information Asymmetrery, Marketing Exclusion, e-Mid Day Meal Scheme	**Access**
Q. Is there any Kisan Kendra in your village that imparts training in Farming techniques? No there is no Krishi Kendra in our village. Villagers can benefit only from the information provided by the villager officers but there is no Krishi Kendra (**"Financial Awareness"**)	Access	**Access**
Q. Do villagers know about e-NAM & information on prices of agricultural commodities through SMS? No, villagers do not have any such information and only brokers (**"Financial Intermediaries & Middlemen"**) facilitate the sale of agricultural commodities and there is no portal. There are no digital markets, farmers sell their produce through the auction in the Physical markets	Information Asymmetrery, Lack of Awareness	**Access**
Q. What are the challenges in using digital channel Due to digital mode and use of English language (**"Vernacular Language"**) predominantly the farmer is deprived of banking services and he transacts mainly through Banks or in cash. In rural area the level of literacy is not very high. People prefer Branch Banking	Vernacular Language, Usage, Digital & Financial Literacy	**Access**
Q. Is there any CSC in your village? No, there is not any CSC (**"Financial Access"**) in our village	Access	**Access**
Q. What are your suggestions about the Digital Inclusion and Financial Inclusion programme? There should be at least one branch bank (**"Physical Access"**) in the village for the convenience of the farmer and for the resolution of the Farmer grievance. And there should be a Centralized office for the resolution of the farmers Grievances (**"Grievance Redressal"**), pertaining to the tractor subsidy, pension, so that resolution of all the farmer problems can be done at one place. Many a time a farmer has to apply for the tractor subsidy online and the portal opens for a very small time. Farmer is unable to reach in time and big farmers with access to technology are able to take the advantage. Particularly, this is true in case of the Small & Marginal farmer they are not able to benefit from the same. Also some training (**"Training"**) should be done so that the farmers become aware. Our area is a Tribal area with good percentage of education population and on priority villagers should be sensitized about the Government schemes.	Access, Farmer Grievance, Government Transfer, Financial Awareness	**Access**

Table 3. Bangsariya village, Madhya Pradesh, India (Attached as a separate file)

	Open Coding	
Q. How many villagers and what percentage knows how to use digital mode such as ATMs, Internet for Banking? Approximately 75% have access (**"Financial Access"**) to Mobile & Digital Banking	Financial Access, Digital Banking & Mobile Banking	**Access**
Q. Do people have Saving Accounts under Pradhan Mantri Jan Dhan Yojana? PMJDY (Pradhan Mantri Jan Dhan Yojan) (**"Financial Awareness"**) is a good initiative by the Government of India and people have benefitted from the same	Account Ownership, Financial Access	**Access**
Q. Are there any bank branches in your village None (**"Physical Access"**)	Financial Access, Physical Access	**Access**
Q. With Internet & Mobile banking the villagers must have benefitted as they won't have to travel to the village? Yes, now the villagers do not have to travel from one village to another. They can get access (**"Digital Access"**) through the mobile. This is a good scheme by the Government of India	Financial Access, Digital Access	**Access**
Q. What are Kisan Credit Cards and what percentage of villagers have access to the Kisan Credit Cards? Most of the farmers have Kisan Credit Cards (**"Financial Access"**) and they have to use it for meeting their working capital needs. Earlier the villagers had to depend on informal sources such as Money Lender (**"Informal Lending"**) now they have Kisan Credit Card (**"Formal Borrowing"**). Schemes by the Government are good and under Modiji things are getting done in a good manner.	Financial Access, Informal Banking	**Access**
Q. With which bank most of the bankers have an account? Were there any training conducted by the Banks? They have Account (**"Access"**) with the Union Bank. NABARD & RBI have conducted a lot of trainings about how to use ATMs and how to see the bank balances online through computer (**"Trainings"**)	Financial Access, Trainings	**Access**
Q. What is the rate of participation by women in Financial Inclusion? Many community programmes (**"Community Programmes"**) have been started by the Government of India. Many groups are running & some are involved in Cloth Weaving & Handlooms. It is for the ladies who want to do something. They also have received Government assistance and Subsidy (**"Government Transfer"**). Meeting for these groups take place periodically every 10 to 15 days. Around 4 to 5 days back a meeting of Self Help Group was conducted to decide what is to be done & what is not to be done. Junta madam (**"Hand Holding by Government"**) came from 2/3. Even Panchayat tries to help as much as possible.	Financial Access, Inclusion & Women Empowerment, Community activities	**Access**
Q. Are there any challenges in availing PM Fasal Bima Yojana? Pradhan Mantri Fasal Bima Yojana suffers from various problems. Let's say farmer has deposited premium of Rs 50,000 but he gets claim only Rs. 40,000. So somewhere these things happen. This scheme is through Kisan Credit Card & farmers are aware. Recently a claim that was processed for that papers were certified by the Patwari and Panchayat helps in getting form filled and getting forms attested (**"Bank Failure"** & **"Complex Documentation"**)	Universal Agricultural Schemes, Kisan Credit Card	**Access**
Q. What are the challenges in implementation of Kisan Credit Card scheme? Kisan has to take initiative. Government will not come to home and help them. Documents have to be complete and everybody from Zila office to Panchayat is ready to help (**"Bank Procedures"** & **"Complex Documentation"**)	Financial Usage & Financial Access	**Access**
Q. Are there any CSC operational in your village? These days everything is done online & through mobiles. Whatever Government schemes are there can be accessed through Mobile. One can access these schemes through Mobile or Panchayat level (**"Digital & Financial Access"**)	Last Mile Connectivity, Financial Access	**Access**
Q. Does your Panchayat provide help & cooperation to facilitate access? Yes, Panchayat provides information through Government circulars, which pertain to citizen centric information (**"Information Asymmetry"**). Panchayat is computerized.	Financial Access	**Access**
Q. What percentage of population is into informal banking through Money Lenders? What is the economic activity in your village Since digitization most of the farmers are benefitting from the Government schemes and there are handful who have to borrow from the money lenders (**"Informal Banking"**). Most of the farmers are selling fruits & vegetables and our village is 10 to 15 Km from the capital. Few have constructed Polyhouse and 2 to 3 farmers are working on Polyhouse	Financial Access, Entrepreneurship, Self Help Groups	**Access**
Q. Do villagers send their children to Government schools that provide free education to children under 0 to 14 yrs under SSA? Yes, all the children in 0 to 14 year age group avail of free education (**"Enrollment to Sarv Shiksha Abhiyaan"**)	Access to Education	**Access**

continues on following page

51

Table 3. Continued

	Open Coding	
Q. Tell something about Savings and Investment behavior & problems in Banking? Villagers have to be proactive. One who does not want to do anything will not get anything (**"Lackadaisical Attitude"**) There is requirement of a bank and ATMs in village. We have written a number of times to Zila and Panchayat but of no avail. Regarding last mile connectivity, Wi Fi routers have been installed but not functional yet. **("No Access")**	Financial Access, Physical Access, Last Mile Connectivity	**Access**
Q. Can you tell us something about e Panchayat and are there any gaps? And also, something about e NAM and dissemination of information about agricultural commodities through Digital Board? As on date there are infrastructure and capacity building gaps **("Capacity Building")**. Due to these gaps' services have not initiated and statewide e Panchayat programme has not started. There is no Digital Board in village and no e NAM implementation or awareness has taken place.	Financial Access, Financial Awareness, Last Mile Connectivity	**Access**

Table 4. Chitrakoot village interview transcript

	Open Coding	
Q. How many people in your village use Digital Banking & Mobile Banking in your village? Approximately 10% of the literate people in our village use Mobile & Digital channel for banking **("Financial Literacy" & "Digital Literacy")**	**Usage, Financial Access to Banking**	**Usage**
Q. What are the challenges to Digital Banking in your village? One of the challenges that the villagers do not own the Mobile Phones and if they own the Mobile, then they do not own the Smart Phones. Only educated class can use these phones **("Mobile Access & Digital Access")**	**Financial Access, Availability of Technology**	**Access**
Q. Did RBI conduct any training in your village? Neither RBI or NABARD conducted any trainings, neither are we aware of any organization that is undertaking these trainings **("Trainings")**	**Training & Education**	**Usage**
Q. Are there any ATMs and Branch Bank in your village? There is no Bank Branch or Bank ATMs in the village **("Physical Access")**. Internet related work started in the village but has not been completed. There is no tower to facilitate Mobile Telephony in the village. Digital is a good technology but basic requirement in terms of infrastructure has to be completed. A wire for Wi Fi was laid down but due to the villager's attitude and behavior the wire was destroyed by the trucks. Money was claimed by the vendors but villagers received no benefit. e Panchayat was electrified but no benefit was given to the villagers **("Bureaucracy, Red Tapism, Insensitivity of Villagers")**	Physical Access, Last Mile Connectivity, Capacity Building, e Panchayat	**Access**
Q. What is the level of internet connectivity & how do the villagers raise money for the economic activities? Mobile connectivity **("Physical Access")** is done but there is no mobile connectivity in the village. If money is needed the villagers do not rely on the merchants and they have to rely on personal relations such as family, friends **("Informal Lending")**. Since the village & the Grameen bank was merged into the National Bank things became all the more different. Bank has to travel to the city and there are multiple problems.	Last Mile Connectivity, Informal Banking	**Access**
Q. What is the knowledge of the villagers regarding the Kisan Credit Cards? KCC (Kisan Credit Card) money is disbursed through Commission Agents. There is difference between the Rural & Urban residents. Old aged people are dependent on others. Some time they are troubled. Government is given lot of schemes but it does not reach them **("Financial Access")**. Villagers are illiterate and they are not confident to meet the villagers. They are dehati **("Illiterate & Financial Exclusion")** and have to rely on Commission Agents **("Middlemen")**. No Banker or Business Correspondent comes to get the form filled. Earlier when there was a Grameen Bank people use to get there. Now in city not even a single villager has benefitted from the information regarding the Kisan Credit Cards, Pradhan Mantri Jan Dhan Yojana. Under Pradhan Mantri Jan Dhan Yojana Rs 6,000 per annum was transferred to the villagers. 75% people did not receive any money **("Bank Failure, "Conditional Exclusion")**. In the villages there are lot of problems	Kisan Credit Card, Illiteracy, Financial & Digital Exclusion, Presence of Middlemen	**Usage**
Q. Is there any Common Services Centre in the village? An online centre is installed & many Village Level Entrepreneurs have applied **("CSC VLE")**. Straight forward people are getting penalized. There is a widow and her claim has been processed for past 3 to 4 years **("Government Failure")**. We want their grievances **("Grievance Redressal")** to be communicated to the villagers	Financial Access, Common Services Centre, Government Failure, Bank Failure	**Access**
Q. What about the attitude of the villagers? Literate villager is self reliant but for the illiterate villager there is lot of problems. Lackadaisical attitude of the villagers has to be changed. **("Digital Illiteracy")**	Financial Literacy, Villager attitude	**Usage**

Table 4. Continued

	Open Coding	
Q. What is the status of Kisan Credit Card Scheme in your village? Bankers are scared of the Kisan Credit Card scheme. If the villager is over withdrawing from the bank, then they are unable to return it back to the bankers. "Financial Literacy" villagers are unable to differentiate between the right & wrong and they are not proficient	Financial Literacy, Financial Access, Kisan Credit Card	**Access**
Q. What are challenges faced by the bankers in implementing the e Governance & Financial Inclusion programme? From the analysis it becomes clear that the villagers do not have any attitude. They are unable to differentiate between Right or Wrong. Villagers have benefitted from Direct Benefit Transfer of cash scheme and people who are unable to get the finance they have to rely on the Dalals and the Commission Agents **("Middlemen" & Commission Agent").** In my Panchayat approximately 15% people are unable to get. There are some deficiencies in terms of wrong Account Numbers and IFSC Code. In many cases the Aadhar card is not linked to the Account **("Financial Illiteracy")**	Financial Literacy, Middlemen, National Identification Number	**Access**

Table 5. Interview 5: Khirma village, Siddharth Nagar, Uttar Pradesh (Attached as a separate file)

	Open Coding	
Q. *What is the usability of Mobile & Digital technology in your village?* Yes people use ATMs and Mobiles ("Usage"). There are 2 branches of Bank in Gram Panchayat	Financial Access, Usage of Mobiles & ATMs, Physical Inclusion	**Access**
Q. Tell something about PMJDY (Pradhan Mantri Jan Dhan Yojana.		
All villagers have bank Account under Pradhan Mantri Jan Dhan Yojana **("100% Account Ownership").** Many times the bankers do not provide loan on pretext of the Land size. Any villager who visits the branch, he is denied the loan. **("Complex Bank Documentation")** Weather based insurance Kisan Credit Card is a good feature. But bankers make villagers run from the pillar to post. Bankers deny granting loan. There are lots of problems in the village.	Government Failure, Bank Failure, Complex Bank Documentation	**Access**
Q. Are there any people borrowing from the Informal channels? There are approximately 40 to 50 people who borrow money from the moneylender **("Informal Finance")** when they are denied loan from the money lender	Financial Exclusion, Informal Banking & Finance	**Usage**
Q.Are farmers able to use e Mandi and is there any Common Services Centre in your village? Do they use ATMs? Did they receive any training? With e Mandi villagers will be able to check the prices online and today online 3 to 4 people are able to check prices online. There is no Common Services Centre **("Finance Access")** in the village and approximately 90% people are able to get benefit under PMJDY (Pradhan Mantri Jan Dhan Yojana). Many people do not use ATMs **("Usage").** Neither any training has been conducted in the past nor there any grievance redressal mechanism to solve problems of the villagers. **("Training")**	Financial Access, Common Service Centre, Physical Access, Information Asymmetrery	**Usage**
Q. What is the role of Woman SHG? Many women SHG (Self Help Groups) ("Self Help Groups") are working & women **("Women Empowerment")** are contributing to village development. They are also mentored by the experts from Government & MFI	Women Empowerment, Self Help Group, Micro Finance Institutions	**Usage**
Q. What are your views regarding the education of the farmer? Education **("Financial Literacy")** of the villagers is not a priority. There is no education centre and there is lack of literacy among farmers. Digital mode is very good but due to lack of trainings **("Trainings")** they are unable to use it. E Mandi can transform villages but there is need to make villagers aware. **("Digital Inclusion")**	Financial Literacy, Trainings, Financial Access	**Usage**

As the analysis reveals that Financial Inclusion should ensure ease of access to the services at the door step of the citizens of India, these codes should be considered for the analysis. All these codes generated through Open Coding mainly fall in category of Access and Usage.

Axial Coding

(Allen, 2017) This refers to the research technique in which data are related together to reveal concepts, subcategories, and categories within-participant views. Soon after the Memo writing, the analysis of codes was done at two levels (1) the actual words used by the respondents (2) our conceptualization of these codes.

From the analysis of the codes regarding *Financial Access* the following relationships among the categories are defined:

- Most of the villagers do not have access to the Financial Services through the Banks and ATMs
- Most of the villagers feel that in availing Kisan Credit Cards scheme and PM Fasal Bima Yojana, there are various issues including the attitude of the bankers, complex documentation, and hence access to the loan facility under Kisan Credit Card is a problem
- Most of the villagers do not have access to the internet through the Last-mile connectivity
- Few villages have got access to the financial services through the Common Services Centre
- Most villagers feel that English language is the main barrier to use of technology for Mobile Banking.
- Most of the villagers have access to Pradhan Mantri Jan Dhan Yojana
- Almost all the villagers feel that the Kisan Credit Card scheme is fraught with Frauds and the presence of Middlemen who charge a commission for providing the services

And regarding the *Usage,* the following observations have been made and the following relationships are made

- Few of the villagers can use the ATMs, internet, and other technologies for banking
- Most of the villagers say that they have not received any training for the use of CSC or the internet
- Most of the villagers feel that using KCC is extremely difficult
- Most of the villagers feel that Women Self Help Groups is the most beneficial scheme and they are availing the benefits of the scheme
- Women who do not use Mobile Phone for banking is due to age and access to Phones

Selective Coding

Financial Inclusion is the main category and all the concepts of Financial Usage and Access relates to this Construct

Data Analysis and Results

Relational Statements

Using the Grounded theory approach, the methodology involves moving from Passive observation to analysis of verbal or textual evidence to elucidate the emergent relationships with the member of the Self-help groups. The study elucidates that Physical access is a major issue in financial inclusion and lack of bank ATMs, within 2 to 3 Kilometers is a major reason for banks not providing credit to SHG

(Self-help group). From analysis of the interview, it becomes clear that financial technology training and knowledge about the Government schemes help in improving financial inclusion. Young women in age group of 15 to 25 years are more likely to own Smartphones and Bank Accounts. Older women as compared to young women are not accustomed to using mobile phones. In order to facilitate personalized banking, Common Services Centre (CSC) or the Kisan Kendra can be implemented to ensure financial inclusion. From renderings of social phenomenon of selling agricultural produce it becomes clear that despite efforts to construct e Markets, the markets are not working due to lack of infrastructure and connectivity. Thus, it can be concluded Capacity building is extremely important for the Digital Programmes in the village.

Table 6. Summary of interviews

Access						Usage				
ATM / Bank	**Mobile Bank**	**CSC**	**e Panchayat/ Krishi Kendra**	**Informal Banking**	**E Nam**	**Mobile/ ATM**	**KCC**	**PMFBY**	**SHG**	**Other**
Chitrakoot Village										
No	No	No	No	Yes	No	No	Bank Failure Complex Process Corruption	Yes		Yes
Bangsariya Village										
No	Yes	No	Work Started	No	No	Yes	Bank Failure Complex Process Corruption	Yes		Yes
Agariya Village										
No	No	No	No	No Few 20%	No	No Few 10%	Bank Failure Complex Process Corruption	Yes		Yes
Suraiya Village										
No But Bank Mitra	No	Yes	Yes Control & Corruption by Government officers	No	No	No Lack of Training Cyber Crime	Most have Bank Failure Complex Process Corruption	Yes		Yes
Sadra Village, Gujarat, India										
Yes	Yes	No	No	No	No	No	No Bank Failure Complex Process Corruption	Yes		Yes
Khirma Village, U.P.										
Yes	Yes	No	No	Yes Around 50 People		Yes	No Bank Failure Complex Process Corruption			Yes

CREDIBILITY OF GROUNDED THEORY

Lincoln & Guba strategies make it easier to validate whether the Qualitative Research meet the criterion of Peer debriefing, Member check & Negative Analysis. Within the Constructivist research paradigm, responses were solicited from the Self-help group members in villages Bangsariya, Khirma and Sid-

dharth Nagar, New Delhi. Further triangulation was used to validate data from multiple sources. As a Constructivist to elicit the meaning of a participant's definition of term financial inclusion and its benefit, responses were solicited from Mungad village Uttar Pradesh, India. As an exception this village served as a Negative case where members do not find financial literacy useful due to inconvenience and effort in learning.

SOLUTION AND RECOMMENDATIONS

In order to facilitate the Financial Inclusion and scheme to the various financial services schemes such as

1. Simplification of the documentation and the banking process for the Kisan Credit Card scheme
2. Information dissemination regarding various schemes such as Pradhan Mantri Jan Dhan Yojana, Pradhan Mantri Fasal Bima Yojana, Common Services Centre through trainings and financial literacy campaigns
3. Infrastructure development and Capacity building through last mile connectivity, Common Services Centre, Business Correspondents in the villages of India

Contribution to Literature

This is the first ever study that aims at contributing to the theory of Financial Intermediation & Social Intermediation through the use of various measures of Financial Inclusion. There is a lack of study on what are the challenges in implementing the Financial Inclusion programme in India through use of instrument such as Kisan Credit Cards. This research study provides a brief overview of factors responsible for lack of credit creation under Kisan Credit Cards.

Banker's training and financial training for the loan officers responsible for managing the rural accounts can go a long way in improving the achievement of the financial inclusion programme. Institutional sustainability remains a major issue as villages lack infrastructure in terms of access to the bank branches, access to internet connectivity and financial literacy. This research study will provide a ready reference for the bankers, policy makers and the regulatory bodies to design the framework for social intermediation and human capacity and institutional building in banks responsible for implementing financial inclusion in the rural India.

EMERGENT THEORY AND CONCLUSION

Financial literacy and financial access are the major issue impeding financial inclusion and thus there is a need for Financial Intermediation through better channels of delivery and social intermediation through better financial literacy campaigns to facilitate financial inclusion. Adverse attitude of the bankers and the empathy is the major reason for the lack of financial inclusion. Bankers are not willing to lend to the farmers due to the lack of collateral and information asymmetry. Thus, there is a need for perfect information to facilitate financial inclusion.

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Chapter 4
Industry 5.0:
A Macroperspective Approach

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ABSTRACT

There will be a revolution in industry and society as a result of Industry 5.0. Human-robot co-working, also known as cobots, is a key component of Industry 5.0. Industry 5.0 will overcome all the limitations of the previous industrial revolution. Humans and machines will work together in this revolution to increase the efficiency of processes by utilising human brainpower and creativity. To solve complex problems more efficiently and with less human intervention, Industry 5.0 provides a strong foundation for advanced digital manufacturing systems through interconnected networks, and it's designed to communicate with other systems, as well as powerful computing power. To enhance customer satisfaction, Industry 5.0 involves a shift from mass customization to mass personalization along with a shift from digital usage of data to intelligent use of data for sustainable development. On the basis of comparative analysis, this chapter outlines Industry 5.0's definition, its elements and components, and its application and future scope paradigm.

INTRODUCTION

Industrial revolution has brought changes in both business & society. With the advent of digital technology, drastic changes has been brought in manufacturing practices. Industry 1.0 (the first industrial revolution) was focused on mechanical engineering and water & steam. The second industrial revolution (Industry 2.0) was focused on electrical engineering. Steam as a primary power source brought about major changes in industries and in people's lives. During the second industrial revolution, mass production assembly lines and electric power systems were developed (Industry 2.0). Automatic manufacturing and the integration of electronics, computers and information technology into manufacturing were dubbed the third industrial revolution (Industry 3.0). It's said that the fourth industrial revolution (Industry 4.0) is automating industry processes and bringing us to the next level of manufacturing based on interconnected technology, smart manufacturing and cyber physical systems (CPS) and the Internet of Things (IoT), where machines will transform themselves in the way they communicate and perform individual tasks. Industry 5.0 is one step ahead of its predecessor and has all advanced technologies with a balance between human and machine interaction and a focus on sustainable development.

The challenges of manufacturing can be fulfilled using digital technologies involving artificial intelligence-based system. Using this AI based system, mass customization and advanced manufacturing can be achieved by employing lesser human efforts. Most monotonous, dangerous, or physically complex and demanding jobs have been performed by robots in manufacturing environments in the past. These include heavy materials loading and unloading in warehouses, welding in job shops, and painting in car factories that require uniformity. An increase in productivity as well as a smarter and more connected work environment have resulted from this technology adoption. By merging cognitive computing capabilities with human intelligence and resourcefulness, Industry 5.0 can achieve collaborative operations. As Industry 5.0, which was introduced at the beginning of this decade, matured and stabilized, the world began to recognize its positive impacts on conventional manufacturing. The highly customized and personalized demand of the product can be meet by adopting the advanced manufacturing technologies to satisfy the need of the customer. Improved performance, higher productivity, profitability and accuracy can be facilitated in the manufacturing process by the adoption and implementation of the emerging tool called Artificial intelligence. Industry 5.0 with the adoption of these intelligent devices are going to transform & gives a new competitive edge and shape to the businesses (Haleem and Javaid, 2019c; Xu et al., 2018). Industry 5.0 with the right blend of automation with human touch helps to get the right product & services to the customer which meets their specific requirements. The deployment of artificial intelligence, 3D printing, virtual reality, adaptive manufacturing which is part of the current industrial revolution, fulfil the concept of product and services personalization as per the requirement of customer or businesses by enabling the industry by following a proper manufacturing process. The enhanced manufacturing capabilities, helps manufacturing processes to be more automated and enables products or services to be more personalized and customized, which is based on the concept of "design freedom". This new revolution with the adoption of new and advanced technologies helps the manufacturing processes and society to make more specialized, personalized, customized products and services with better job conditions using interactive interaction between human and machines (Lu, 2017; Reinhardt et al., 2020; Ozdemir and Hekim, 2018).

Introduction to Industry 5.0

Interaction and coordination between humans, machines, and robots working side by side to enhance productivity using a sustainable approach is what Industry 5.0 is about. Advanced technologies such as the Internet of Things (IoT) and big data allow humans to work more efficiently and effectively with the help of robots. A personalized human touch is added to the automation and efficiency of Industry 4.0. Robotic efficiency combined with human brainpower is the key to various industrial and social development in Industry 5.0. The use of industrial robots, a key component of Industry 5.0, is required to produce mass-produced personalized products. All manufacturing processes become automated as a result, allowing for a new production method to be developed. Customer requirements require a strong cooperation between humans and machines, which is characterized by Industry 5.0. It is possible to interact with humans in interconnected and shared workplaces by using intelligent software. Advanced technology based on Industry 5.0 has as its primary goal to produce large quantities of high-quality products that are complex, personalized, and precise (Li and Xu, 2003; Ozkeser, 2018; Da Xu, 2014). Additionally, it assists in meeting the customer's plethora of updated requests in an ever-changing market environment.

A number of industry experts believe that the implementation of Industry 5.0 will disrupt the existing business model, as well as blur and remove the boundaries between the real and virtual universes (Scanlon, 2018). This is according to a recent article published by Bloomberg on the German automobile industry. The article states that more space in production factories will be given to humans so that more customization can be done as per the requirements of customers (Atwell, 2017). The Chief Technology officer of the Universal Robots, stated that high demand by the customer related to individualized products which they buy will lead to this new industrial revolution (Østergaard, 2018).Table 1 shows the various definitions of Industry 5.0

Table 1. Definition of industry 5.0

Author(s)/organization	Definitions
Breque, et al. 2021	Industry 5.0 recognizes the power of industry to achieve societal goals beyond jobs and growth to become a resilient provider of prosperity, by making production respect the boundaries of our planet and placing the wellbeing of the industry worker at the center of the production process.
Javaid and Haleem(2020)	Industry 5.0 is a shift from mass customisation to mass personalisation, especially to fulfil the requirements of an individual customer having advanced facility for automated product tracking, with smart supply chain having aware customer
Nahavandi (2019)	Industry 5.0 will pair human and machine to further utilize human brainpower and creativity to increase process efficiency by combining workflows with intelligent systems
European Economic and Social Committee (EESC, 2018).	Industry 5.0 as "…focused on combining human beings' creativity and craftsmanship with the speed, productivity and consistency of robots"
Johansson, 2017	Industry 5.0 is about collaboration between humans and machines on the factory floors
Rada, 2017	Industry 5.0 is "to utilize efficiently workforce of machines and people, in synergy with the environment. It goes back from a virtual environment to a real one. Industry 5.0 includes 6R(recognize, reconsider, realize, reduce, reuse & recycle) methodology and L.E.D.(logistics, efficiency, design) principles
Østergaard (2016),	Industry 5.0 is the return of the human touch on the factory floors.
Sachsenmeier (2016),	Industry 5.0 is related to bionics and synthetic bionics. Bionics is "the imitation or abstraction of the inventions of nature"
European Commission(2012)	Bioeconomy is the production of renewable biological resources converting these biological resources these resources and waste streams into value-added products and bioenergy.

On the basis of the industry 5.0 definitions listed in table 1, two visions for industry 5.0 emerge. "Cobots" or "human-robot co-working" is the first vision, while the second vision is to produce renewable biological resources using bioeconomy. In the first vision, strong coordination and interaction between robot and humans, which results that they will work together as much as possible depending upon requirements. As part of the duo coordination between humans and robots, humans will focus on the creative tasks and robots will handle the rest. It's a bio economy-based vision of Industry 5.0 that involves converting waste into value-added products and bioenergy(European Commission 2012; Demir & Cicibas, 2018). Sustainabilty can be achieved by using these biological resources intelligently in industrial production, supply chain (Tiwari 2015), and society. European Commission (2012) defines bio economy as "the production and conversion of renewable biological resources and waste streams into value-added products such as food, feed, and bioenergy". Agricultural, forestry, fisheries, food, pulp and paper production, and chemical, biotechnological, and energy industries are all included in this sector of the industry. Biotechnology, nanotechnology, information and communication technologies (ICT), engineering, and local and tacit knowledge are some of the factors that contribute to its high innovation potential". Based on the principle of biologization, bioeconomy has the potential to bring about a radical and fundamental change in the operation and productivity of industries (Berkey 2005). Therefore, the next industrial revolution, bioeconomy has to play an important role since it will lead to sustainability.

INDUSTRY 4.0 VS. INDUSTRY 5.0

Industry 4.0 focusses mostly on automation by utilizing and involving robots, interconnected devices and fast data in the production process or within a factory environment to achieve higher productivity and efficiency, where the complex, repetitive and routine task are better done by robots with higher precision and not best done by humans. Industry 4.0 provides multifold benefits to businesses and supply chain process by integrating them resulting in increased productivity (Tiwari, 2020). The shift of Industry 4.0 revolution towards Industry 5.0 revolution, by allowing customers to customize and personalize what they want. The true potential of this revolution which is Industry 5.0 can be harnessed and leads to progress of this revolution lies in the strong collaboration between humans and machines, since it lessens the emphasis and dependency on technology and brings a strong paradigm change in industry. Industry 4.0 is very similar to previous industrial revolution, since it focus mostly on mass customization production based on automation with least consideration on environmental issue (Demir et al. 2019). Due to current industrial revolution, the world is facing severe increase in environmental pollution along with industry also has to deal with waste generation and management which further lead to environment pollution. The companies' major concern area in current scenario is multifold, on one side they have to deal with environmental issues related to generation of pollution, pollutants and how to reduce it without much effecting production along with the management of waste generation and its disposal. Environment consideration is the most challenging and the bigger concern of industries and their success will depends on its effective management. Gotfredsen (2016) collaboration between humans and machines has many advantages, including (i) ability to customize, adding the creative human element. There will be a creative human touch on the production instead of a standard robotic production, (ii) new jobs will be created, and (iii) human workers will assume better roles on the factory floor. A major challenge for industry is how to upgrade all the machines, tools, and devices in Industry 4.0 to improve manufacturing processes and systems, resulting in increased productivity, profitability and a reduction in quality

errors(Xu, 2000a; Gurdur et al., 2016; Xu, 2000b). Strong and appropriate digital communication is the foundation of a smart manufacturing system based on Industry 5.0 technology. Industry 5.0 uses data intelligently for creating sustainable environment, based on research and development using automated procedures for enhancing the productivity of facility which was missing in Industry 4.0, since it is purely based on digital usage of data. Factory operations become more flexible, since multiple factories are now interconnected and are effectively communicating with each other. To improve the manufacturing system, Industry 5.0 combines automation with human touch and interaction(Kim, 2017; Gorodetsky et al., 2020; Demir et al. 2019). Industry 5.0 implementation makes efficient, competent & smarter supply chain (Peruzzini and Stjepandić, 2018). In addition to human-robot co-working, Industry 5.0 focuses on bioeconomy.

Table 2. Comparison of industry 4.0 vs. industry 5.0 (vision 1 and vision 2)

Industry 4.0	Industry 5.0 (Vision 1)	Industry 5.0 (Vision 2)
Smart factory/smart manufacturing/ smart production	Human-Robot Co-working	Bio economy & Bionics (Focus on social & economic factor)
Mass customization	Smart Society	Sustainability
Digital use of data	Intelligent use of data	Intelligent use of data for sustainability
Create digital factories	Creates smart factories of the future	Creates sustainability for the future
Electrical power Fossil-based fuels Renewable power sources	Electrical power Renewable power sources	Electrical power Renewable power sources
-Internet of Things (IoT) -Cloud Computing -Big Data Robotics and -Artificial Intelligence (AI) -Blockchain technology -3D printing -cyrptocurrency	Human-Robot Collaboration Renewable Resources	-Internet of Things (IoT) -Cloud Computing -Big Data Robotics -Artificial Intelligence (AI) -3D, 4D & 5D printing -Holography -Smart sensors -Virtual Reality -Robotics
-Organizational Research -Process Improvement and Innovation -Business Administration	-Smart Environments -Organizational Research - Process Improvement and Innovation -Business Administration	-Medical treatment -Sports -mental treatment Agriculture - Biology -Waste Prevention -Process Improvement and Innovation -Business Administration -Economy

Automation and edge computing are combined in an intelligent and distributed manner for the optimization of processes with a core focus on improving process efficiency, but the importance of human contribution and human cost in the production process is unintentionally ignored by industry 4.0. Therefore, Industry 4.0 faces resistance from labour unions, which will overshadow its benefits as well as create fear of unemployment among workers as a result of its implementation, decreasing the importance of humans in decision making processes as a result. There is no environmental policy or advanced technique in Industry 4. There are no technologies aimed at improving the sustainability of the planet's environment

in Industry 4.0. Industry 5.0, on the other hand, has advanced technological solutions devoted to saving the environment and increasing sustainability by bringing a balance between environment, society, and economy. Humans and autonomous machines will be able to collaborate and synergize better with Industry 5.0. Intentions and desires of humans will be able to be sensed and perceived by the autonomous workforce. Because of Industry 5.0, robots will no longer just be programmable machines that perform repetitive tasks according to the instructions programmed into them. Instead, Industry 5.0 will make and transform robots into ideal companions for humans in certain scenarios (Nahavandi, 2019). Technology advances, such as artificial intelligence (AI), data analytics, Internet of Things (IoT), cloud computing, robotics and blockchain technology as well as 3D printing, cryptocurrencies and other advanced technologies, will drive Industry 4.0's transformation (Ustundag and Cevican 2018). Interoperability, information transparency, technical assistance, and decentralisation are some of the design principles of Industry 4.0(Lewis, 2017). These four design principles can be defined as (i) interoperability – Uses IoT and supporting machine to machine communication for integrating industrial machines and tools (ii) information transparency can be seen as virtual copies of real-world objects generated using computer system (iii) technical assistance – human workers efficiency and effectiveness can be increased by computerized machines with AI application (iv) decentralization – execution of tasks on their own by the implementation of technical systems. These four principles (Lewis, 2017) underpin the implementation of Industry 4.0 and support the transformation of enterprises in accordance with Industry 4.0 standards. Horizontal integration, vertical integration, and end-to-end engineering are required for the successful transformation of an enterprise in accordance with Industry 4.0 standards(Ustundag and Cevican 2018). The three dimensions are defined as: (a) horizontal integration - for elevating product lifecycle und efficient financial management through value creation between organizations and businesses by real time data sharing and accurate planning for smooth material flow; (b) vertical integration - cross-linking and digitalization of business units by collaborating within different hierarchical level of organization resulting into a smart factory by transforming a traditional company's having high flexibility by sharing real time data and supports in accurate planning; (c) end to end engineering - digital technology integration for managing customer demands and requirements by bringing changes in design and development process of product and service. Agile, efficient, innovative, customer-centric and revenue-generating are just a few of the benefits that come with Industry 4.0(Almada-Labo, 2017). The benefits of Industry 5.0 and Industry 4.0 include increased profitability, agility, and productivity, as well as improved adaptability and change-readiness. (Kospanos, 2017) and overall cost reduction (Rada, 2018). The two most important social benefits (Rada, 2018) are as follows:

1. The global society is evolving by the adoption of automation based on digital transformation will transform new businesses as well enhanced the skills by providing training to forward-thinking employees;
2. As well as saving money and preserving the environment, proper waste management can also help you connect with the community and improve your social standing.

Industry 5.0 is considered as a faster, more flexible, and people-centric industry than its predecessors. They have the right kind of advanced technology at their disposal (Rundle, 2017). Industry 5.0 using its advanced technology will enhance advanced human-machine coordination, interaction, interfaces by an improved collaboration, between robots and humans resulted in better pairing of human creativity and power with robots for better automation (Shelzer, 2017) with a better outcome in the form of improved

productivity. This enhanced coordination and efficient cooperation between humans and technology will not only brings positive impact on economy but also to the ecology, and the social world (Shelzer, 2017). With its application in industrial upcycling, waste management and prevention further support Industry 5.0 revolution (Rada, 2018):

1. Physical waste – waste generated in the form of trash in production lines and logistics;
2. Urban waste – the waste generated by households and hospitals must be disposed of in green fields
3. Process waste – waste due to process errors and overproduction
4. Social waste - Individuals who are willing to work, but lack the means to do so, as well as those who are not.

FEATURES OF THE 5.0 VERSION INDUSTRY

Innovative applications in Industry 5.0 can speed up innovation and provide support for the development of intelligent materials using intelligent manufacturing systems by the adoption of smart devices to support new business concepts. While Industry 5.0 aims to delight customers by personalizing products, increasing productivity and efficiency and improving product quality, it also encourages industry to improve flexibility and innovation in manufacturing by implementing automation and co-bots. Using smart sensors and devices improves the computing capabilities of intelligent devices and increases their accuracy. This revolution improves the ability to make decisions in complex and critical situations with greater accuracy. A world-class manufacturing system is essential for the future of Industry 5.0 by integrating new machines, software, and information technologies in order to provide a world-class manufacturing system through the integration of new technologies (Chen, 2017a,b; Demir et al., 2019). Since the products in Industry 5.0 are produced as per the requirement of customer, will lead to drastic reduction in the wastage of raw materials. Industry 5.0 uses the advanced system which led to the usage of intelligent materials, innovative and intelligent devices to support the automation of process and systems. Industry 5.0 started using intelligent and smart materials which can change, take shape as per requirements, situations, to time and can also change its properties under the influence of external environment like temperature, heat and pressure. Software-based digital manufacturing, which is the backbone of Industry 5.0, will enhance the experience and implementation of high-precision and complex-shaped products using technologies such as collaborative robots, 3D and 4D printing, smart materials, and adaptive manufacturing. Intelligent devices, intelligent systems, intelligent automation, and intelligent materials are the four elements of Industry 5.0 as shown in figure 1 (Javaid & Haleem, 2020).

● Devices that are connected to the internet and have advanced computing capabilities will assist in controlling, managing, and monitoring the operation functionality and performance of the manufacturing system by maximizing security.
● On the basis of their interaction with the physical and social changes in the surrounding environment, intelligent systems perform personalized tasks based on the industry's needs. For example, it can be used in a variety of industries like production unit automation and logistics as well as in education and research & development.
● To improve the productivity, reliability and safety of the system, intelligent automation is needed to provide instant action for performing complex tasks automatically. For monitoring, detect-

ing and managing any risk or fraud using machine learning, and enhancing customer experience through innovative products and services.

- An intelligent material, also called a smart material, is a substance that can take on different forms depending on the situation, time, and requirements. It can also change its properties under the influence of external stimuli such as stress, magnetic field or light.

Figure 1.
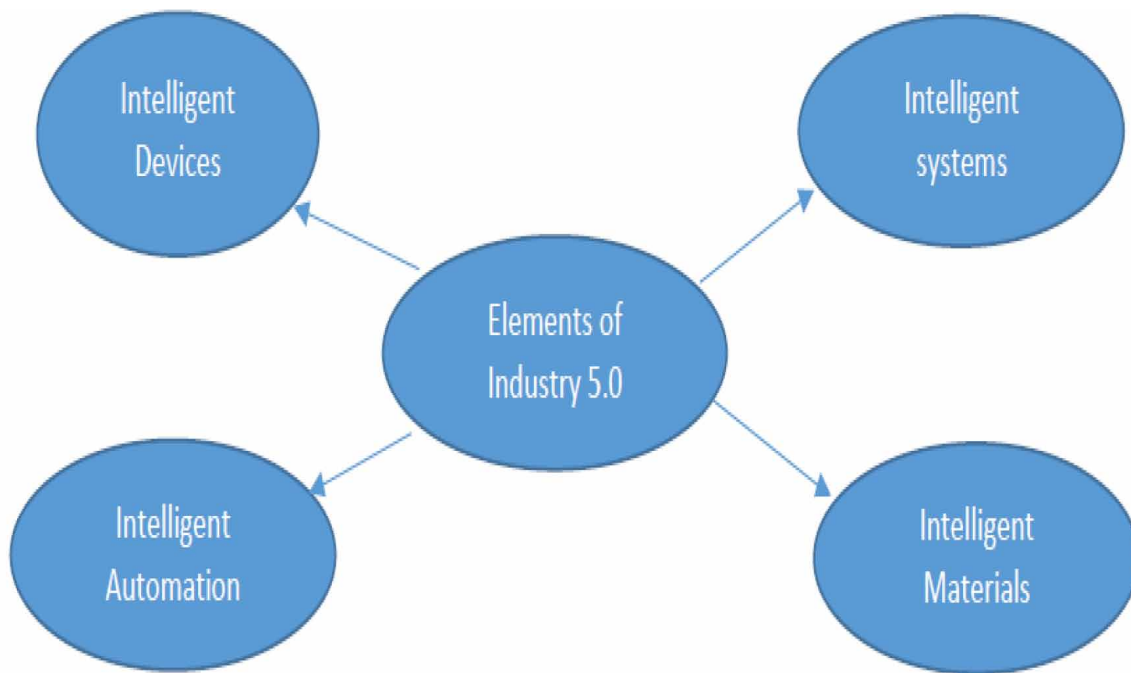
INDUSTRY 5.0 COMPONENTS

Robots in manufacturing environment have traditionally and historically performed precision dangerous, monotonous task or work which requires physically demanding. In metal shops, white goods factories, car factories, and warehouses for loading and unloading heavy materials, these tasks include welding and painting. There will be an integration of cognitive computing capabilities with human intelligence and resources as part of the Industry 5.0 revolution as machines and workplaces become smarter and more interconnected in order to achieve collaborative operations. Sustainable development will be achieved through waste reduction, increased safety and improved quality checks. Industry 5.0 encourages innovation in manufacturing and services. There will be a decrease in human efforts with the use of intelligent machines. Use of intelligent devices can provide other benefits such as smooth and easy tracking, strong decision-making abilities and increased productivity. It can also improve efficiency and profitability. Using robots to assist and speed up the work process will lead to a significant reduction in the amount of human involvement in the job. Use of intelligent devices can provide other benefits such as smooth and easy tracking, strong decision-making abilities and increased productivity. It can also

improve efficiency and profitability. Using robots to assist and speed up the work process will lead to a significant reduction in the amount of human involvement in the job. Due to their design and programming, these robots can operate under all conditions (Javaid & Haleem, 2020). In addition to artificial intelligence, collaborative robots, internet of things, internet of everything (IoT) and big data, virtual reality and holography are all part of Industry 5.0, as well as 3D, 4D & 5D printing, adaptive systems, smart sensors & smart materials and multi-agent systems, among others (Javaid & Haleem, 2020) as shown in table 3 & figure 2

Table 3. Components of industry 5.0

Big Data	It consists of extremely large data sets that needs to be analysed computationally to study especially human related behaviour and interactions, and can be used increase productivity and quality checks
Artificial Intelligence	Artificial Intelligence uses human intelligence processes and using machines simulate it and is applied to solve complex universal problem in lesser time
Internet of Things(IoT)	IoT collect and transfer data over a wireless network without human intervention using interrelated, internet-connected objects
Internet of Everything(IoE)	IoE is the intelligent connection and is used for the seamless connection for the interaction between human to human and machine to human and it involves people, process, data and things
Collaborative Robots	Collaborative robots or cobots is a robot intended for interaction between humans and robots are in close proximity or direct human robot interaction within a shared space. These robots are programmed for creating automation in the process and to perform a unique task in the shop floor
Smart sensors	A smart sensor is a device that perform predefined functions upon detection of specific input and then process data before passing it on and for that purpose it uses input from the physical environment and uses built-in compute resources.
Multi-agents systems	A multi-agent system interact in a shared environment to achieve common or conflicting goals and it primarily consists of multiple decision-making agents. It helps the system to enhance overall performance, responsiveness and efficiency.
Smart Manufacturing	Smart manufacturing (SM) utilizes Internet-connected machinery to monitor the production process and is based on is a technology-driven approach
Adaptive system	An adaptive system is based on the concept that it changes its behavior in response to its environment and is sometimes also referred as complex adaptive system (CAS)
Smart materials	Smart materials or intelligent materials has a unique property play that is changes itself with respect to the surrounding environment examples are piezoelectric materials, shape memory alloys,
3D printing	The 3D printing process saves energy and material wastage by printing material in one go and for that it makes the object from the bottom-up, slice by slice and for that it turns a whole object into thousands of tiny little slices. Those tiny layers stick together to form a solid object.
4D printing	4D printing is the advance process of 3D printing in which a 3D printed object transforms itself into another structure over the influence of external energy input as temperature
5D printing	5D printing is a branch of additive manufacturing. In this process, the print part moves while the printer head is printing, allows the creation of lighter, more complex designs that are too difficult or too expensive to built
Holography	Holography is a photographic principle that produces 3D images that are so close to real. It is used in information storage, recording of images in depth in medical field
Virtual rality	Virtual reality (VR) refers to a simulation where person can interact within an artificial three-dimensional environment using electronic devices, such as special goggles with a screen or gloves fitted with sensors. It has application in sports, medical health, mental training, education and fashion

Figure 2.
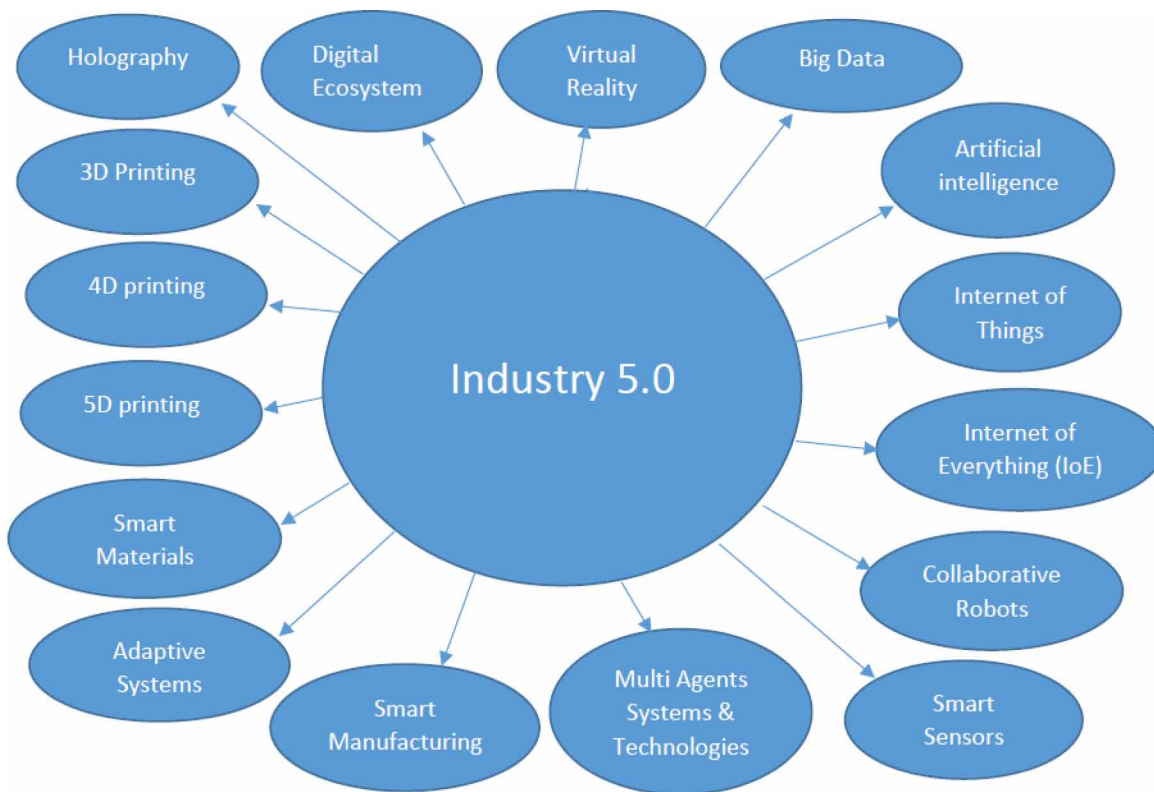
FUTURE SCOPE

Industry 5.0 has immense scope in the future and is poised to serve the humanity and environment through its advanced technologies and directed towards sustainability using automation. It has its application in manufacturing for increasing productivity, quality checks, enhancing the performance of supply chain and evaluation of risk which directly impacts profitability of the organization. This industrial revolution is built on strong foundations of its predecessor which is Industry 4.0 and tries to overcome all its limitation. Industry 5.0 with its advance technology helps in handling complex medical situation using artificial intelligence, 3D and 4D printing, digital economy(Gorodetsky et al. 2019) and has its application in mental treatment, orthopaedics (Haleem & Javaid 2019a), complex surgery, dentistry, health management. Industry 5.0 can also be beneficial in financial sectors, retail industry through providing personalized products which helps in enhancing customer experience. The potential is unlimited and in all facets of life & needs to be further explored.

CONCLUSION

The Industry 5.0 is definitely going to revolutionize both the industry and society in a big way, since it has both the benefits of advance technology with human intervention or human touch along with sustain-

ability, so in short it can be called as automation with human touch or autonomation with sustainable methods. It will overcome all the negatives of Industry 4.0 and with the rapid advancement of technological processes and innovations, revolutions over the next 10 years and beyond could ultimately follow one another in quick succession. Whereas the first three industrial revolutions took decades to play out. Industry 5.0 can smooth production system by automating all the process it's handing and managing for smooth production. There are a lot of applications for it in the manufacturing process with robots and in the retail and financial sectors as well as in the medical field with mental treatment of patients, orthopedic surgery, which will revolutionize treatment and surgery and pave the way for future research using advanced technologies. An important result of this revolution is a better human-machine interaction that impacts efficiency, product lifespan, customer service, and business model significantly. For example, 3D-symmetry in innovation ecosystem design, artificial intelligence application in various manufacturing systems, adaptive manufacturing for complex product design as well as extreme automation and Big Data with safety are some of the ways Industry 5.0 is poised to harness the advance technology. In order to support innovation in ecosystems and their constituents, it builds a complex and hyper-connected digital network without compromising long-term human safety.

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Chapter 5
Artificial Intelligence and Personalized Banking

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ABSTRACT

AI has begun making its presence felt in every industry and now across the financial services industry as well. This chapter examines and presents the use of AI in banks for better customer service giving them a personalized experience. This chapter explains how banks are getting future-ready for their financial services by means of AI and are delivering financial offerings seamlessly. This research primarily focuses on the concept of AI in the field of banking, how AI has revolutionized personalized banking and made banking operations more efficient and successful. AI innovations are an integral part of Industry 5.0 which aims at integrating automation and human intelligence. This chapter aims to study and describe the current applications of AI in the banking industry and its impact on the banking sector. The study also gives a description of the banks employing AI to facilitate an exceedingly personalized customer journey with the banks.

MISSION OF THE CHAPTER

The aim of the book is to provide deeper understanding of the relevant aspects of AI impacting Banking services for better output and to generate a significant personalized experience to their customers. Readers will get reliable and comprehensive information on use of AI in banking practices. The chapter provides detailed and well-illustrated concepts of AI and its application in banking sector in the present and the coming years.

TARGET AUDIENCE

This chapter aims to give a full length report to students, academicians, researchers and corporate experts who are in the field of management and Computer Science about fundamentals and advanced concepts concerning artificial intelligence in the Banking sector. The chapter will serve as a valuable guide for industry experts and will also help novices and students to understand concepts including fundamental and advanced.

RESEARCH METHODOLOGY

The research design of this research paper is descriptive. The type of research done is descriptive in nature because study describes the status of artificial intelligence in banking sector with the help of facts and information already collected.

DATA COLLECTION METHODS

Secondary data was collected for the study and it was analyzed to understand and evaluate the role of AI in banking operations. Secondary data collection has been done from diverse sources like web blogs, articles, research papers, newspapers etc.

OBJECTIVE OF THE STUDY

The study was undertaken to gain insight into the advent and role of Artificial intelligence in the banking sector & also to examine the contemporary AI techniques and tools that has been transforming the operations of contemporary banks across the globe.

LITERATURE REVIEW

(Navleen Kaur, Supriya Lamba Sahdev, Monika Sharma, Laraibe Siddiqui, 2020) This research study examines and explains the conceptual theory and usage of AI in the banking industry. The paper also describes the radical transformation brought about by AI in banking services and its outcome on bank employees and customers. The study explores the present AI technology and its applications in the banking industry.

This paper is a quantitative study and hence has used concise and informative analysis for quantitative data collection. The research design of the paper is exploratory and descriptive. The research type of the study is exploratory in nature and it conducted in-depth surveys.

(Meghnani, 2020) The aim of the research study was to examine the importance of using AI and Blockchain technology in Scheduled Banks in removing the manpower dependency in doing the various banking operations. IT also studied the impact of these technologies on bank manpower and the efficiency of the banks.

(Vijai, 2019) The objective of the paper was to examine the areas where the artificial intelligence is being used by the banks in India and to examine the application of Artificial intelligence in Indian banking industry. The research paper is a descriptive study and secondary data was used for the study. The secondary data collection was done from various bank reports, newspaper articles, research papers, bank websites and RBI portal.

(Salunkhe, 2019) This research paper examined the role and usage of AI in Indian banks with special reference to SBI and HDFC bank to provide customer services. The research revealed that AI assists banks in improving their customer services. It was an explorative study using primary and secondary sources of data of both the banks. The paper concludes that banks require enormous capital investments for implementing AI. There are many challenges with respect to customer and employee accepting the new technology and Data security and privacy. Researchers recommended that banks should do lot of promotion for the usage of AI in their branches by the customers and bring strict regulations and policies in to facilitate more practice of AI in their operations.

(Karippur Nanda Kumar, Pushpa Rani Balaramachandran, 2018) The research paper studies Robotic Process Automation (RPA) and its usage in the banking sector. It also studies the factors that influence customer experience in retail banking services brought in by RPA. The paper throws light on the role factors that persuade the approval and implementation of RPA in the retail banking sector. The study reveals that there are several features like security, privacy, reliability and usefulness that significantly influence implementation of RPA in the retail banks. The paper highlights the practice of Robotic Process Automation (RPA) to daily operations and provides innovative services and enhanced experience to customers.

(Sindhu J, Renee Namratha, 2019) This paper studies the AI and its implementation in the elected Indian commercial banks. The paper focuses on Cost Benefit analysis of AI in the banks. This study took in to consideration 5 leading commercial banks in India. Secondary source of data collection through detailed literature review was done. Primary data was collected using structured questionnaire given to customers to gain knowledge about their usage of AI application. The study revealed that banks are implementing AI services customers are not very much aware of it. The study also reveals that customers are willing to use AI technology in banking services provided they are assured of security and ease of use. s The study states that banks must emphasize on capital investment, sustainability, promoting AI awareness and data ethics to be more successful in AI implementation in their services and operations.

(Jewandah, 2018) The research paper examines the AI application in banking sector with special reference to leading banks in India, namely, SBI, ICICI, HDFC, Axis. The paper explored the scope of AI in the Banking industry. A digital revolution took place in the banking sector after demonetization .The traditional banking operations have transformed ad have become more digital oriented. AI technology is being used by the top banks in India to reduce their operating costs and improve their processes. Future improvements in the AI technology will lead to increase use of AI application n banks.

(Bhavna Agarwal, Himanshu Agarwal, Parvez Talib, 2019) This study focuses on AI and its evolution, adoption, implementation and future opportunities in banking industry in India. A good number of research papers were reviewed to examine the AI in banking sector. Literature review revealed that AI is being used in Indian bank in aspect of banking strategies e.g. surveillance, fraud detection, guarantee compliances, credit assessment, customer service, handling repetitive voluminous tasks.

(Veerla, 2021) The study tried to assess AI related literature publications. The research paper used a systemic content analysis methodology. Primary data collection was done of research papers, posts, etc. This study also examines peer-reviewed publications, including Scopus and SSRN. The paper describes

76

that the banking sector enlarge its strategy execution with the use of latest digital technologies to give better services to its customers. This study also describes the evolution, adoption, implementation, and future opportunities of leveraging. Banks are utilizing Artificial Intelligence (AI) for implementing their corporate strategy successfully in banking industry in India. The paper concludes that the banks are going in for practical application of AI in various their strategies and operations e.g. surveillance, fraud detection, legal and documental compliances, credit assessment, customer service, etc.

(Sadhana Tiwari, Shashank Bharadwaj, Sunil Joshi, 2021) The objective of this paper was to evaluate the effect of cloud computing and artificial intelligence in banking sector. The study used Confirmatory factor analysis (CFA) technique for analysis. Cloud computing and artificial intelligence have positive influence on customer service, enterprise longevity, automation, better operational competence, cost reduction, security management. The paper states that banks and financial institutions should design and build service and distribution models in alignment with the organizational stability, cost efficiency.

(Chakroborty, 2017) This study examines role and applications of robotics in the finance and retail banking. The paper states that a Robotic Framework is required consisting of hardware and algorithmic details to design an effective robotic platform. The paper aims to form an autonomous artificially intelligent robotic platform to bring algorithmic changes for a number of industries. This paper explains that a robotic platform will impact improving the processes of different AI enabled industries. In the future digital's bank will assume a supreme role and support automation and adaption in the banking sector.

INTRODUCTION – INDUSTRY5.0: AN ERA OF AI

Industry 5.0

The first Industrial Revolution made it very clear that technological revolution is constant phenomena. The human being has realized the prospects of applying technology for achieving sustainable growth. Automation technology has been influential and advancing productivity and business value. Industry 5.0 is a revolution, fosters collaboration between humans and machines. Industry 5.0 brings out a new business model which aims to creating a seamless interface between humans and machines. Industry 4.0 paved the way for digitalization, data base management, robotics, automation, IoT and the smart factory. Industry 5.0 goes further involving integration and collaboration between machinery and the creativity of the human mind. Industry 4.0 focussed on minimizing human involvement and adapting process automation. However, Industry 5.0 reversed the pattern by striking a balance between human involvement and machine efficacy for higher goal achievement.

Industry 5.0 means people's work synchronizing with the machines. Robots and smart machines are assisting the human operations to make human being more able and powerful. Industry 5.0 encourages leveraging superior technologies for making the human task easier and more productive. Industry 5.0 is intended at unification of computing and internet capabilities with human intelligence and ingenuity in synergic functions.

ARTIFICIAL INTELLIGENCE

In general terms AI makes use of machines to carry out multifarious and complex operations which otherwise can be performed by human intellect. CEO of Google Deep Mind, Demis Hassabis, says it is the "science of making machines smart." Using AI machines are able to observe and evaluate the different levels of environment and build optimum set of alternatives to use in different sets of environment. Any device, machine, computer or robot with AI competence can identify and understand relevant data, do an in-depth analysis on it and extract relevant information from the analysed data to be used for solving various issues and problems. Thus AI helps in the improvement of overall performance and increase productivity. Russell and Norvig have mentioned in their book, "Artificial Intelligence: A Modern Approach," (Stuart Russell, Peter Norvig, 2020) that an intelligent machine can sense, comprehend, act and learn continuously and incrementally. AI can be used effectively by the banking and other financial institutions to influence every component and process of the banking service value chain.

APPLICATIONS OF AI IN BANKING

Banking industry has evolved and right now going through the phases of digital revolution. Digital revolution has facilitated more opportunities and also presented more challenges for the banking service towards interactions with their customers. Digital Banking has made perceptible transformations in offering better services to the customers which has helped in amplifying the dedication, commitment and retention of loyal customers. Consequently banks across the globe are on spree to invest huge capital in digitalizing their operations and potentials such as biometric, virtual reality, improved App, virtual assistants, chatbots, artificial intelligence (AI), predictive models and open APIs. AI will enable banks in cost savings and new revenue opportunities. Digital revolution has endowed the banking industry with new digital technologies and tools such as blockchains, virtual reality, cloud computing, artificial intelligence, machine learning, algorithms, intelligent apps. All these have created the appropriate environment for the extended use of AI in banking. The example of the Royal Bank of Canada can be quoted here which has proposed to explore a better integration of machine learning in its operations. The banks are now learning to encompass complex analytics, machine learning, AI, data science and AI-powered database into its backend processes. Banks are using AI in their operations to enhance the personalised experience for their customers. This results in increased customer satisfaction and maintains customer loyalty. AI is being employed by the banks to transform levels of the customer experience by promoting smooth and seamless round-the-clock customer interactions. Beside, AI also leverages the functioning of back office and middle offices of banks and other economic organizations.

(Marous, 2021) A study done by World Economic Forum reported that 85% of all financial institutions have implemented AI in some capacity, with fintech firms leading legacy banks and credit unions by a slight margin (90% vs. 80%).

In the exhibit above we can see that the potential for value creation is one of the largest across industries, as AI has the potential to fetch about $1 trillion of incremental value for banks, annually. The digital transformation which is powered by AI technologies leads to decreasing costs for data storage and processing and amplifies easy accessibility and connectivity for all stake holders of the bank. These AI technologies are bringing advanced automation and finer decision making in terms of both speed and accuracy.

Figure 1.
Source: World Economic Forum
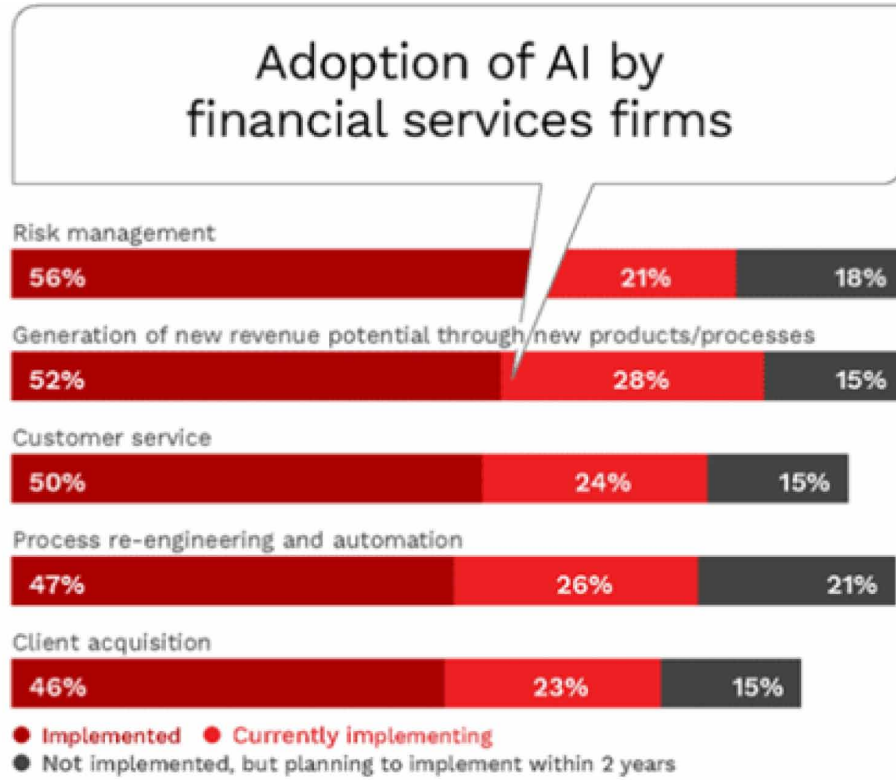
Figure 2.
Source: "The executive's AI playbook," Mckinsey.com
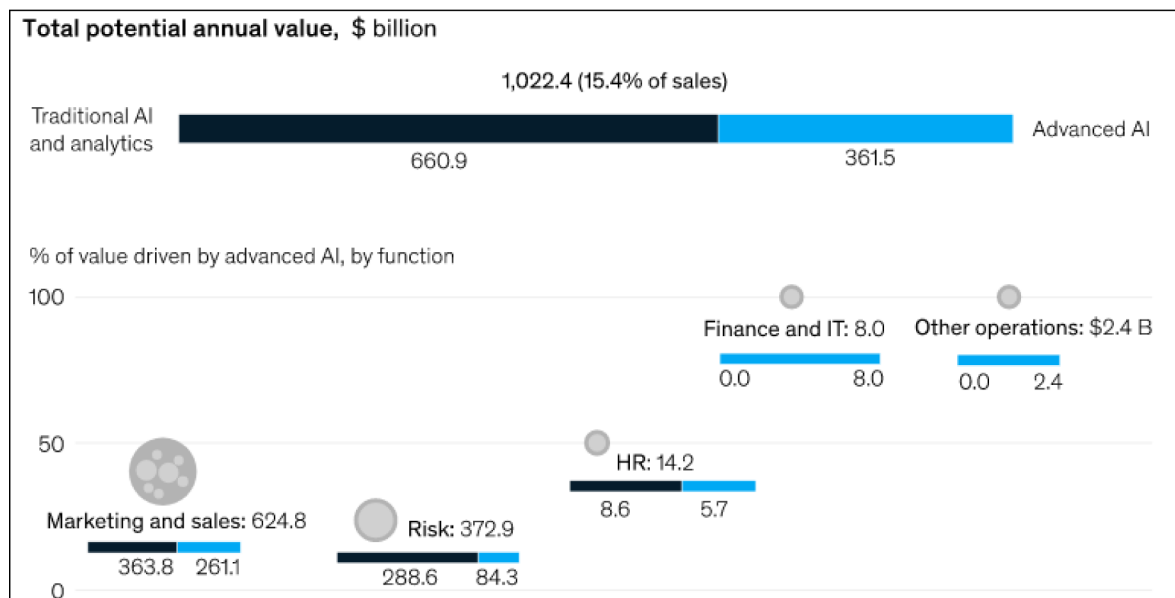
Banks can exploit cognitive technology with Artificial Intelligence (AI) and take the benefit of digitization to meet and win competition locally and globally. According to a study done by National Business Research Institute and Narrative Science2 around 32% of financial service providers are already using AI technologies like Predictive Analytics, Voice Recognition, etc. The three main channels where banks can use artificial intelligence are front office (conversational banking), middle office (anti-fraud) and back office (underwriting).

Enhanced Personalized Services

Consumers are expecting more personalization in banking operations. Consumers in this digital era want more personalization through seamless interactions with the banks. With the help of artificial intelligence banks are leveraging big data to tender more enhanced personalized services to their customers AI studies the online buying behaviours and patterns. Of the customers and accordingly interact and offer services to the customers. Customers are digitally able and desire to communicate with the bank and do all their transactions without visiting the bank. They want a timeless and virtual bank which offers all the banking services even when they are at home or in office or while shopping. Today's customers expect banking services at click or swipe of their finger and on the go. AI helps the bank to stay ahead in this digital race. AI can be used to utilize the customer data and generate extrapolative and relevant information about the customers. Better understanding of the data helps in creating better personalized services that suits the needs of the customers that improves the customer experience. (Goswami, 2020) AI in banking services empowers the banks recognize customer behaviour patterns by utilizing transactional and other data sources. Using AI banks can add more value to their services towards their customers. AI tools help the banks to know and value each new customer's journey to the bank and their buying behaviour. AI also helps banks to observe regularly customer's movement and transactions which facilitates real-time delivery of highly personalized services directly to the customer automatically and digitally.

Improving Digital Experiences

Banks are using AI for identifying prospective customers and provide them personalized flawless banking experiences. AI gives seamless service to the bank customers. In this digital age customers are going digital, in the sense they prefer digital service from banks. AI can be used to improve the digital service given by the banks. AI can be used to understand the behaviour patterns and banking activities of the customers and then draw conclusions. This analyzed data can be used to give suggestions to the customers and drive them to better banking services and transactions. AI identifies users and their various needs customers, segregate the needs into common groups and analyse their common behaviour. Then AI, based on their behaviour pattern accordingly gives personalised services and experiences, and thus garners loyalty of the satisfied customers. Many banks use AI to persuade and steer their customers towards using their payment cards more recurrently. For instance, when a buyer uses his bank credit or debit card to pay for his hotel bills, AI is used by the bank to guide them to more discounts and offers if they used cards frequently for other transactions too. Thus AI is used to recognize and examine the preferences of their customers and provide more personalized services leading to increased brand loyalty and customer retention. AI is also used by the bank employees to give better and relevant consultations and advises to their customers. Banks have begun using chatbots that automatically manage and manipulate routine and casual calls and clarify common queries.

AI Enhanced In-Person Interaction

Studies have revealed that today customers are becoming gradually more comfortable and feel secured with digital banking operations. However, quite a lot of the customers still prefer to have a face-to-face communication and physical dealing at the bank physical office or branch. Still globally a significant percentage of customers prefer to visit a branch. AI technology and tools are being used to automate several tasks and operations in the banks and they are also fostering further value-addition to the in-person interaction where ever it is required and expected by the customers.

Banks are coupling the benefit of personalized digital financial services through the use of technology and the personal contact that a retail branch offers and thus are able to maintain a rewarding association with their consumers in manifold environment while offering services that an online-only mode cannot give.

Further, AI can replace many functions in banking which are presently executed by individuals. AI can be used by the banks to give a better service to their clients by making the accessibility of important information and announcements much easier. Take the example of U.S. Bank which formed an artificial intelligence enterprise solutions unit, which is used for payment systems, virtual explanation and clarification system and innovation practices. The bank is utilizing AI to supply an enhanced virtual service to its clients by solving their queries and doubts related to the bank offerings and bank-initiated loyalty programme. Bank has started using AI to build and present readymade machine generated answers for such kind of less usual questions and enquiries. Now the bank employees need to seek advice from experts in another department of the bank to provide immediate guidance to customers presenting such queries. Nordea bank also lately launched artificial intelligence technology to help it which analyse their customer text queries. These queries are routed automatically to the experts dealing with the area of concern. AI technology has been used to build software that takes a few seconds to operate upon thousands of queries thereby reducing the response time. This indeed has helped the bank in improving their customer service. An enhanced customer service leads to a better customer experience which in turn helps the bank in retaining profitable customers.

But beyond facilitating more direct interactions, AI also assists in expanding customer bases. For example, some banks are using machine learning models to assess the creditworthiness of the customers who do have any traditional credit histories with the bank. AI thus gives predictive data that helps banks in formulating better-informed decisions and enlarges the bank's customer databases.

Further, AI is also being utilized by the banks in another major process that is fraud prevention. Many banks have started using AI to investigate the customer behaviour and behaviour patterns to recognize fraudulent a unscrupulous practices. In this context many experiments are going on where AI can examine the real-time voices and accent of the customers and then run a recognition process to validate the customer, or even analyze the voice samples recorded in a directory of identified imposters and crooks to prevent fraudulent practices.

AI TECHNOLOGY IN BANKING OPERATIONS

The banks are running on with bringing innovative and advanced technology to improvise and enhance their services and operations. AI is one such technology that today almost all banks local or global have adopted to be competitive and be more efficient in their working. Banks are strategically deploying AI

that facilitates substantial benefits. The planned application of AI technologies such as machine learning, natural language processing and computer vision is offering significant benefits for the banks in increasing employee efficiency and customer experiences and improving back-office processes. AI also helps in cost cutting. Accenture reports that "banks can achieve a 2-5X increase in the volume of interactions or transactions with the same headcount" by using AI-based tools.

1. **Drive-Thru Banking** – Drive-thru banking facilitates banking transaction without leaving the car. Customer has to get into a lane he can do transaction through a window. Voice AI coordination has been build up in drive thru banking.

2. **Conversational AI System** – Conversational artificial intelligence (AI) refers to technologies, like chatbots or virtual agents, which are for communicating with the users. They are virtual representatives the customers can talk to. Banks have begun using huge volumes of data, machine learning, and natural language processing technology to reproduce human verbal communications, recognizing speech and text inputs and deciphering their meanings across various languages. Conversational interfaces are getting adopted by the banks for customer engagement. Banks are promoting voice commands replacing in-person interactions in the branch offices. Quite a number of banks have already commenced voice-activated assistants, for example ICICI bank in India with iPal; SBI Intelligent Assistant (SIA), an AI-powered smart chat assistant, HDFC bank's smart chatbot called Eva; Axis bank's conversational interactive voice response (IVR) system, called AXAA, and many more. Conversational AI platform provides an innovative AI technology which has revolutionized conversations in banks. The AI technology applies natural language processing that understands how people really talk, enhancing extraordinary customer experiences. The company has used this technology in many fintech and major banks such as USAA, Barclays and S&P Global. This AI technology is adopted into the bank's system that imitates human intelligence and can interpret unstructured, unconstrained human speech. The idea is to let users converse with their bank account using natural language without pre-defined templates or hierarchical voice menus.

3. **Payment Kiosks** – Banks utilize payment kiosks to as an alternative for their services. Payment Kiosks can be used by a customer to deposit or withdraw his money or pay for any bills. AI has made payments self-automated in payment kiosks and enables customers to enjoy freedom in doing their purchases and other bank transactions.

4. **Passbook Updation Kiosks –** Passbook printing kiosk is an automatic kiosk installed in the banks to have machine-driven printing of passbooks of their customers without the bank employees getting involved. Such Kiosks uses barcode technology and enables customers to update their passbooks comfortably.

5. **Chatbot** – A chatbot refers to software that reproduces human-like conversations with customers by means of text messages on chat. It provides answers to the customers' queries. Banks are employing AI-driven chatbots to transform the customer experience and improve the everyday banking of their customers seamless. Chatbot also known as AI virtual assistants are replacing bank employees' job of communicating with their customers on phone or face-to-face. The AI driven Chatbot are offering a real-time human like conversation to the customers. These Chatbots provide instant solutions to the customers' queries and reach out to millions of them simultaneously.

6. **Cash Deposit Machine** - The Cash Deposit Machine, also identified as Automated Deposit cum Withdrawal Machine (ADWM) is a self-service terminal and functions like ATM It enables depositing of cash directly into the account using the ATM cum debit card. Customer need not visit

bank to deposit cash. The machine saves time and provides comfort of fast and easy deposit of cash without visiting the bank. The transaction receipt is also provided by the machine showing the updated account balance.

7. **Mobile Banking** – Mobile banking gives the customers 24x7 banking service at the comfort of their home and office. AI has been able to enhance and improve the mobile banking operations using machine learning and predictive technologies. Banks use AI in their mobile apps to provide an enhanced and flawless experience to their customers. The financial life of the users have improved using mobile banking as the AI in mobile banking helps and guides them to manage and control their money and have better investments. Banking apps are made more intelligent to give the users with personalized perceptions and learning and suggestions. For example, Varo Money is a company has revolutionized the financial activities and experiences of their customers with the help of their app Varo. Varo is an intellectual mobile banking app designed to refine their user's financial life by encouraging positive spending, savings, and borrowing habits.

8. **AI-Based Algorithms and Fraud Detection** – Banks have begun deploying AI technologies to work smarter and perform more efficiently. (Ronald Schmelzer, Linda Tucci, 2021) AI technology is being used to automate decision-making and improve internal bank processes. AI-based algorithms are used to analyze that customer information and enable the banks to accurate and unbiased decisions. This speed up the bank processes. AI-based algorithms are used by the banks to authenticate the transactions and prevent fraud payments in real time. Thus banks can be assured of higher security and fraud detection.

AN AI-ENABLED FUTURE – FUTURE IMPLICATIONS OF AI IN BANKING

AI is definitely going to be commonly and increasingly used technology and practice in the banking sector in the coming years. More and more number of banks is adopting technology and tools in their banking operations gradually. Needless to say, that the banks need to surmount and tackle the issues and challenges posed by the AI adoption and execution. Banks need to work progressively towards making strategic decisions and synchronising infrastructure and other resources including manpower to build a cohesive technological foundation and foster an AI driven and AI oriented culture in their organization to be more AI enabled in future.

In future banks need to move towards total AI functioning in all their operations. AI evolution will have to be completely adopted and executed in the banks in all their processes and platforms. Banks which are now experimenting with AI technology soon have to engulf AI completely in near future to work more efficiently and effectively and be more competitive. Banks need to invest in infrastructure and technology learning and trainings to have full scale implementation of AI technology in their enterprises for sustainable development and survival.

(Prakul Sharma, Shailender Sidhu, Omer Sohail) Banks will have to focus on the following vital aspects to deploy and operate AI driven enterprise productively in future.

Table 1.

	Step 1: Design AI strategy Creating an AI strategy is the first step towards a successful AI driven banking operation. AI strategy should be in sync with the overall corporate strategy and corporate goals. Banks need to utilize AI capabilities for a seamless AI execution**.**
	Step 2: Delineate a Value-driven process Banks should engage on value-driven processes through AI technologies and employing varied AI potentials. AI should not be used only as solution giver instead it should add value to the business processes.
	Step 3: Research on prototypes Prior study should be done on building better prototypes because they become the essential aspect of AI foundation and strategic alignment with AI technologies. A detailed study on prototypes will reflect upon overall AI design and process outcomes
	Step 4: Technology and Infrastructure Banks need to build an AI infrastructure focussing on storage, networking and AI data needs, requiring planned and strategic scheduling and planning. Technology and infrastructure requirements need to be ascertained by the banks. Subsequent challenges also require to be tackled skilfully. Technology requirement for data and for various levels of data identification and analysis needs to be determined
	Step 5: Foster Collaborations Banks are moving towards 'Open Banking' concept in order to grow wholly collaborative, facilitating an enhanced personalised service to the end users. Nurturing a collaboration culture will escort the banks in spreading out their services. Banks should seek to experiment with new alliances**.**
	Step 6: Extend corporate capacity Banks need to break the reluctance to change for digital transformation. This transformation requires bank to be more flexible and enlarge its capability to embrace change in its processes. Systems would undergo integration with newer technology. The core banking processes and infrastructure should not be rigid or restrictive to adaptive AI technology and AI models**.**
	Step 7: Training and Skills Development Training and skills development is essential for AI- oriented enterprise for its AI initiatives. Banks would require recruiting new employees proficient in AI technology. Experts like data analysts, data scientists, developers, cyber-security experts, network engineers and IT professionals having a number of IT and AI skills support and facilitate AI practices and maintain AI infrastructure. Banks need to build a strong team for facilitating and functioning in artificial intelligence infrastructure and technology.
	Step 8: Ethical and legal issues AI revolves round a number of ethical and legal issues. Banks need to foster an ethical culture in the system to ensure consent and data privacy. The AI led operations should be devoid of any kind of bias or discrimination towards its employees or its customers.
	Step 9: Promote sustainable culture For a more sustainable future AI culture needs to be developed. Issues like employee impact, engagement and communication with AI implementation needs to be resolved prudently. AI should not impact human jobs negatively but the employees must be trained and upgraded to monitor and handle automated tasks and processes. Change management should be facilitated to effectively employ the planned AI projects. Banks must move further ahead from AI implementation to augmenting and leveraging capabilities for future value addition

84

Challenges of Future

Banks are extensively embracing AI technologies gradually. AI has become affordable and accessible to the banking industry. Nevertheless, the ethical use of AI is a big concern. Banks must now work towards creating a more liable and accountable norms and policies in their systems and enterprise. There is an urgent need for an ethical culture in the banks for a moral and principled deployment of AI. The regulatory systems in banks should fasten the loopholes in AI strategies implementation. Banks must be aware of the unethical use of AI which can defy regulatory norms and public policy. Banks in future ought to design an AI policy for acceptable usage of data. They must build corporate AI governance models to protect the quality and authenticity of data. Proper control machinery should be built to examine and categorize and eradicate prejudiced data and algorithm-driven programs.

Visualizing the banks in 2050 without AI is not possible. AI soon will grow beyond just being a choice to a requisite for survival and sustainability. The AI-enabled banks will have the competitive advantage sustainable legacy. Conventional banks need to compulsorily modernize their operational teams to survive and continue in business. The future bank should indispensably be AI-powered self-service bank with AI driving all its operations.

FINAL THOUGHTS - CONCLUSION

The banking sector is has begun to witness the vibrations of AI disruption with the world responding to a fast shifting dynamics and advance technology. Competition and technological advancement in the banking space have compelled banks to resort to AI to give enhanced personalized services to their customers. Active and innovative apps are preferred and demanded by the younger customers who are more digitally literate and exposed to newer trends and tools across the globe. AI enabled services facilitate higher customer satisfaction by offering personalized platforms and experience to them.

Banks operate today **in** a very volatile, dynamic and belligerently competitive setting that, they are forced to work harder to recognize their customers' needs and aspirations and create innovative marketing communications to build better customer engagement. Customers also expect to be rewarded for being loyal to the bank and therefore banks need to strategies to successfully retain them. Banks can leverage technology with the assistance of optimum application of AI, to offer superior products, enhanced services, meaningful interactions and relevant agendas and schemes that take focuses on creating positive customer behaviour – loyalty to a brand. AI facilitates real-time and digital experiences which add value to both the bank and the customer. AI is used by the banks to exploit data that helps them to personalize their offerings and services. AI builds brand loyalty by giving more personalized service to the customers and keeping them delighted. AI thus enables banks to deliver appropriate and real end-to-end personalization and thus gives a competitive edge. Banking sector began deploying AI with the use of transactional analytics, risk management and fraud detection. Now AI has modernized the way people use banking service. Banks have created mobile apps to give reliable, advanced and superior quality touch points to their customers that giving them banking solutions. World is yet to witness a gigantic change towards personalization and customization as AI will be utilized further and more to promote automated transactions employing millions of data points and efficient data mining and data management.

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Chapter 6
Artificial Intelligence and Automation:
Transforming the Hospitality Industry or Threat to Human Touch

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ABSTRACT

Transformation is being observed in almost every sphere of life. Industries accept technological advancements by accepting artificial intelligence and automation to improve the quality of products and services and to have errorless processes. The industry has a large number of human resources, and it functions on the concept of human touch, also known as the essence of hospitality; however, with the advent of artificial intelligence, fear of losing the human resources and human touch in the industry is paramount. The authors of the chapter detail the significance of the human touch in the tourism and hospitality industry. The chapter also highlights the usage of artificial intelligence in tourism through predictive analysis, travel experiences through virtual assistance, and the digital transformation tourism and hospitality have observed mainly in the coronavirus pandemic. It ends with a discussion on artificial intelligence in tourism and hospitality as support system for human resources or enhanced service quality and customer experience.

INTRODUCTION

Transformation and changes are being observed in demography as well as in industry. The world is witnessing significant breakthroughs in terms of technological advancements. These Advancements are resulting in the progress of countries and societies. Undoubtedly, the quality of life and living standards of people is also enhanced. The demography of the world is also changed. Generation Z is entering

the market both as one of the most significant sections of the customers and the global workforce. The need of the time is to understand the need of the people based on their characteristics. Also known as digital natives, Generation Z has Access to information about the world. They are easy and comfortable using technology and automation (Bhalla et al., 2021). The presence of technological advancements in artificial intelligence and automation is also getting visible in every industry. People are getting familiar with its usage and finding their life easier and more manageable. Perhaps, the reason is educated societies that comprise a significant section of Generation Z. Interestingly, the human civilisation functions based on emotions and feelings. From the very beginning, our bond with nature and humans is based on emotions. The service industry reflects the same, which requires a human touch to pass emotions to the customers. The hospitality industry is one such industry where the presence of humans has always been a necessity (Solnet et al., 2019). Serving with a smile or presenting the food at the table has always been understood with passing off emotions. The various division of the hotel industry, such as the kitchen department, front office, housekeeping, food and beverage, all require humans to execute the operations smoothly. However, artificial intelligence, machines, and automation are majorly accepted in the hospitality industry with the advent of time. It has been predicted that one-quarter of hospitality jobs in the United States of America and more than half of the hospitality jobs in Japan will be performed by machines (Bowen & Morosan, 2018).

Interestingly, the early evidence of incorporating artificial intelligence and robots in services and operations of the hospitality industry highlighted the adverse outcomes. In China, robotic waiters were fired from serving in restaurants because of technical difficulties and errors. Similar incidents were reported from other developed countries based on the common ground robots creating more problems than easing the operations (Drexler & Beckman Lapré, 2019).

The hospitality industry functions on the concept of human touch. The pertinent question is the goodness of replacing human employees with robots and machines. Introducing machines in hospitality services may improve the service quality and experience but how good their functioning will be in terms of minimum error is a matter of concern. Moreover, the involvement of machines in hotels and hospitality creates fear of job loss among employees (Ivanov, 2020). Considering the present context of the coronavirus pandemic where no touchpoints and contactless services emerged as a necessity, the hospitality industry is evolving with technological advancements. However, technology, artificial intelligence, machines, and automation being substituted or supplementary to the human workforce requires in-depth understanding. The chapter discusses the involvement of artificial intelligence in the hospitality industry, how it enhances customer service and experiences, is it emerging as a challenge to human employees, and the concept of human touch in hospitality? The chapter builds the argument in the form of a debate and highlights the good and the bad of artificial intelligence and automation in the hospitality industry. It also details the importance of human resources in the tourism and hospitality industry and why not considering artificial intelligence and automation as a substitute for human employees.

HOSPITALITY INDUSTRY AND HUMAN TOUCH

The presence of human touch in services, particularly in the hospitality industry, is inseparable. Earlier it used to be regarded as an element of competitive advantage, but its significance in hospitality is being replaced by technology and innovation. The ground for technological advancements flourishes on the logic of reducing labour cost, human errors and higher efficiency of service delivery (Solnet et al., 2019).

The hospitality industry comprises of various segments like at the higher end one may find more luxury experience while at the other hand basic amenities at accommodation works for the guest. Interestingly, to create memorable experiences, research has shown that at the higher side of luxury accommodations, creating emotionally engaging experiences requires encounters between the hotel staff and the guests. From the organisation side, the human resource channelises holistic experiential offerings to the guests that further connects the guests and the hotel staff at an emotional and personal level (Harkison, 2017).

Artificial intelligence and automation in the hospitality industry can be considered disruptive innovations. Christensen et al., (2013) defined disruptive innovation as a term in business administration wherein an innovation creates a new market and value network and eventually disrupts an existing market and value network, displacing established market-leading firms, products and alliances. Interestingly, the organisations' human resources in general and hospitality, in particular, are neither products nor things. These are the resources that give directions and channelise the production and service processes. Almost every industry is experiencing transformation, particularly in the context of digitalisation and automation; however, technological disruptions in human resources that are replacing human resources or employees of the organisation with robots and other machines may dissolve the human touch component. It will be more visible in the form of disruption, whereby human touch is the core of the experience, particularly in the hospitality industry (Joshi, 2018).

Human touch and interaction by the human employees working in hospitality create values like compassion and warmth towards customers. Technology-driven organisations in hospitality are increasing rapidly; however, considering it as a substitute for the human workforce may have long term effects. With time, the hospitality industry and its services evolve and transform their processes to enhance efficiency and minimise errors. However, the traditional viewpoint of providing hospitableness to the customers is based on the human touch that is the essence of hospitality (Solnet et al., 2019). Kandampully & Solnet (2020), highlighted the need of assessing the level of human touch and the level of technological interventions in creating service experiences as determined by the customers. Thus, the future course of hospitality depends upon the balance of efficiency, human touch, and technology. An example of the significance of human touch in hospitality embedded in a culture and values are presented in Box 1 below.

Box 1. Indian Hospitality and Human Interface

The human interface in the tourism and hospitality industry functions as a heart of the business. In a country like India where the guests are treated as God, the human connect is primary to hospitality. A guest at home or in a hotel is welcomed with a smile and a traditional ritual of 'Tilak', welcoming through garland, and a welcome drink. The gesture of warmth and compassion in hospitality gets reflected across the star category of hotels in India. Hospitality from the initial stage begins with human interface whereby human touch enhances the customer experience. The same gestures are visible in staged experiences at places like Chokhi Dhani in Jaipur, Rajasthan as the idea of human touch and reflection of warmth towards guests is embedded in Indian culture, values, and ethos. In this case, service quality based on interaction with a human employee enhances the customer experience and substituting it artificial intelligence, automation, and robots may fade the human connection between the host and guest.

The ethical issue considering the recent trend of increasing role of artificial intelligence and automation in tourism and hospitality sector would the deciding factor of minimising the displacement of human from hospitality services. Automation and machines should be placed in the system in a subordination and supportive role to the humans to enhance the service experience of the customer instead of replacing the humans and giving full control to the machines.

ARTIFICIAL INTELLIGENCE AND AUTOMATION IN HOSPITALITY INDUSTRY

Artificial intelligence (AI) is very strategically used in the travel and hospitality industry. Hoteliers and travel agency needs to capture the necessary customer information; AI enables them to understand their behaviour, essential touchpoints, preferences, payment methods. It helps store necessary customer information through their digital footprints, facilitating the collection and organisation of data via digital media. In the tourism context (Stienmetz, 2018; Zach et al., 2018), automation could help estimate tourists' destination preferences, entertaining guests and visitors. However, the hospitality industry has changed in the past decades. The technology-driven customers are exposed to general information available on digital or social media platforms. In order to improve the adoption of technology to deliver service experience through Robots, artificial intelligence, and service automation, popularly known as RAISA, is introduced, thereby facilitating the shift in the focus of the Hospitality industry from "How the service is Provide" to "what is provided". Artificial intelligence in the coming years will become faster, cheaper, and more welcomed across industries, considering making it more reliable than humans. Machines would have more precision in service operations and be more efficient in processes; however, the issue would be exploring the new possibilities of introducing machines to work alongside humans and not in place of humans (Li et al., 2019).

AI is set to transform the tourism and hospitality industry. Companies with preliminary information about the customers can now get speedy information and understand customer preferences beforehand, enabling the companies to deliver customer services that enhance the decision-making process. Prahalad, C. K. and Ramaswamy (2004) consider this transformation as a "co-creation of value. The speedy information captured can help understand consumers and reach the right customers, and interestingly it can enhance their decision making. The need for innovation is essential. Many tourism and hospitality providers have focused their investments on process innovation and product innovation (Bilgihan & Nejad, 2015). For example, as process innovation, Marriott Mobile App has introduced innovation in the hotel service experience. With other routine functionalities, Marriott mobile App serves as a digital room key that allows guests to go directly to their room instead of waiting to be checked in. Examples of product innovations are the increased popularity of guest room automation and the use of artificial intelligence. For example, CitizenM hotel in London has introduced the "Moon Pad" – a tablet that enables hotel guests to take "complete control" of their room, including room temperature, lighting, TV, and even window blinds (Nicholls, 2014). With the introduction of Natural language processing technology, chatbots can now converse effectively with the customer and assist them in researching and booking to stay. MakeMyTrip has already invested heavily in AI, and machine learning (ML) enabled Chatbots and Voice-based booking tools to enable the vernacular market to book travel in their regional language. In this way digital technologies are creating value for the customers by providing reasonable and quick services.

AI and Personalisation through Predictive Analysis

In the Hospitality Industry, predictive analysis is being used to anticipate and meet customer needs and preferences effectively. Predictive analysis collects the online data and then makes predictions based on customer preferences using algorithms and machine learning. These algorithms can analyse customer's historical data to deliver the best deals on customer preferred locations. Advanced predictive analysis can improve forecasting. The Hawaii authority campaign "Discover Your Aloha" introduced facial

recognition software to analyse customer expressions while viewing the videos on their website or app via webcam. A predictive analysis was applied to deliver customers offers and discounts based on the information and expressions recorded while watching videos and making suggestions in the end booking. With Geolocation tracking, the companies can deliver unique/ customised offers. With predictive analysis, sellers understand the customers' searching and buying habits and target advertisements and emails based on predictions.

Travel Experience through Virtual Assistance

The potential of advanced AI and Robotics is no longer reserved for companies to deliver automation through products like IBM Watson or Google driverless cars. The automation is now set to deliver a superior customer experience with automated service deliveries. WELC maps–travel in AR helps customers scan the maps of the place and then make suggestions based on the map like hotels, restaurants, and other exciting places. It also assists in making a hotel booking, flight tickets and information about the directions and durations to the destination. The global potential of artificial intelligence is exponential. The benefits of AI are not hidden in various industries. The growth and rising needs of AI must be taken into consideration.

Transformation in Hospitality Industry during Covid-19 Pandemic

The outbreak of the COVID-19 pandemic started in December 2019, affected almost every sector of the economy. The pandemic changed the socio-economic functioning of the world, and its effects will last for a long. Technology has a significant role to play. The pandemic has forced many businesses to go Digital to reach aligned customers as per their needs and wants. COVID-19 phase is the phase of a great hospitality industry reset (António & Rita, 2021). Research in hospitality tourism has revealed that intelligent tourism and social media have an essential contribution to the pandemic era. The thoughts on sustainable cities, changes in tourist behaviour with information available online, local-destination development have enormous relevance and growth in coming time. The key is tourism transformation keeping the futurist approach of the hospitality industry in an unprecedented time. The intervention of AI has started a survivable business model. Possibility of a customer becoming comfortable with technology and get in line with AI settings in the near future for planning their travels, making payments and making reservations without going to travel agents are high.

AI helps the hospitality industry work smarter, resulting in better business outcomes and requires them to develop new competencies and capabilities, from technological expertise to social and emotional skills and creative skills (Ivanov & Webster, 2019). At the same time, AI may cause human talent to be replaced by technology in some cases and lead hospitality and tourism businesses to become challenged to redesign their structures and processes as a result (Ivanov, 2020; Ivanov & Webster, 2019; Prentice et al., 2020b). With the introduction of 4G, people are getting familiar with AI efficiency, and with 5G, AI and robots are planned to be a significant part of the transformation in the coming decade. The COVID-19 pandemic has transformed human life with contactless concepts, and with robotics and AI, the customers can enter a hotel by doing check-in through a mobile app or face recognition can verify the customer. The entry at the hotel room becomes keyless, and any order can be placed via QR code displayed in room settings. The virtual tools given by Google maps or gathering information via the app without connecting to anyone has become possible.

Box 2. Covid-19 pandemic and contact less service transformation in hospitality

The world has seen devastating effects of the COVID-19 pandemic. It has changed the functioning of the existing systems and became a reason for speedy digitalization as the same became a necessity. The global ban on travel restrictions and lockdown adversely impacted the business of tourism and hospitality industry. However, with time the hotels and travel agencies transformed their functioning by reducing the human touch points as the same was a solution to control the spread and transmission of the corona virus. Machines that clean and sanitize the premises, reduced interaction at the reception and front office, closure of dine in service or improvised version of dinning experiences were introduced. The human touch points were kept minimum and technology that facilitates check-ins without human interface were introduced. The hospitality industry observed the increased usage of artificial intelligence and machines and reduced human interface during the COVID-19 pandemic and the digital transformations were common worldwide.

ARTIFICIAL INTELLIGENCE AND MACHINES CAPTURING HUMAN PRESENCE IN HOSPITALITY INDUSTRY

In past decades AI and Robotics were majorly used in commercial platforms. However, recently, automation and advanced technology it has helped customers to make better economic decisions. In the Hospitality industry introduction of chatbots, destination suggestions based on the customer searchers, and frequency technology may introduce personal agents (AI-empowered) to make decisions like reminders, making payments, getting personalised updates on travels and discounts, and setting an itinerary. The customer has also started using digital platforms to interact with bots as frontline executives to solve their queries (Service Robots). PWC predicted that, by 2030, one-quarter of hospitality jobs in the US would be automated. AI is also believed to reshape tourism models and hotels by disrupting the traditional model. The technology enables accurate and reliable information related to travel. The customers can customise their hotel reservations, travel plans, destination planning through online platforms. This saves time with traditional methods where customers deal with agents to book their travel plans (Buhalis & Sinarta, 2019; Zlatanov & Popesku, 2019). Ruel & Njoku (2020) stated that AI technologies with defined role play could improve talent and talent management practices as a supportive system in human resource management.

Further, the introduction of self-service technology (SST) enables customers to produce direct service employee involvement. It is a service delivery process from the company's employees to the customers. It includes a predetermined step for the customer to book or make payment to the hotel. SST is amongst the early adoption in the tourism and hospitality industry and is reasonable than survive robots (Ivanov & Webster, 2019). AI and machine learning are helping the industry to make predictions related to tourism demands and arrivals, for analytical purposes, like identifying destination attributes, predictive and sentiment analysis of customers reviews, and impact of online reviews on hotel performance (Kirilenko et al., 2017; Law, 2000; Palmer et al., 2006; Phillips et al., 2015).

One of the crucial challenges faced by Robotics & AI is the blend of hospitality and humans. Hospitality services are fundamentally and traditionally based on "Human-to-Human interactions". Henn-Na Hotel is a popular hotel chain in Japan, where most of the work is done by Robots, but many customers complained about the service failure. They had stopped the services of half of the robots following complaints from unhappy guests. The unnecessary interruptions were reported during the day when virtual assistance in the room assumed human conversation as the command to them, and also the human snoring also confused the robot's understanding of human behaviour. Another important finding of the past research was reduced productivity and higher turnover of human resources. Hospitality companies welcome artificial intelligence at the workplace, but this welcoming gesture makes the existing human

employees feel undervalued and unappreciated. They feel insecure and stressed about their jobs and prefer to leave the organisation (Li et al., 2019). Technology-based operations may enhance service performance by promoting efficiency, but the same should not be considered a substitute for human employees. It has been predicted that automation and artificial intelligence will significantly impact the job market of the tourism and hospitality industry, at least at the places where automation of process is required; however, the job positions that require human-to-human interactions to deliver superior quality service experience will be safe (Ivanov, 2020).

Artificial intelligence enhances customer experiences but cannot replace the human touch. AI and Robotics can contribute to adequate complementary dimensions for future tourism (Saini & Gananapala, 2021). Even though placing robots to practice and service automation in service quality is increasingly vital for organisations to gain a competitive advantage, the issue of guest experiences and the provision of more personalised guest experiences is doubtful (Naumov, 2019). The service encounters create service experiences at different stages of the consumption process, and employee engagement is essential to deliver a satisfactory customer experience (Nixon & Rieple, 2010). Research indicated that while AI and automation improve the efficiency of the process, the absence of human touch and interaction may result in poor service quality experiences. The challenge would be redesigning structures and processes after introducing automation in hospitality organisations. The same would have implications on customer experience, customer satisfaction, employee engagement, retention and productivity level, and thus, a trade-off between artificial intelligence and human resources must be achieved (Ivanov & Webster, 2019; Ruel & Njoku, n.d.).

CONCLUSION

The emergence of artificial intelligence and automation with technological advancement is making its place in every industry, and the tourism and hospitality industry is no exception. Human resources in the form of employees are the core and essence of the hospitality industry. Human touch allows the guests and customers to feel the warmth and compassion of human employees, making their experience more hospitable. However, it is predicted that robots will replace some humans in the hospitality industry that will disrupt the present service delivery system (Bowen & Morosan, 2018). The phenomena created the fear of losing employment and jobs amongst the human resources working in different sectors of the travel and hospitality industry (Drexler & Beckman Lapré, 2019; Ivanov, 2020).

Artificial intelligence used in creating robots for increasing operational efficiency attempts to make humanoids look like humans and think like humans; however, the robots are equipped with machine intelligence, but the same lack highly complex emotional intelligence (Prentice et al., 2020a). Presently, chatbots controlled by artificial intelligence are being used in the tourism and hospitality industry. It is being used through natural languages where a customer may feel like conversing with a human (Zlatanov S, n.d.). Interestingly, the experiences of hotel customers are found to be much more superior through the human-to-human interface compared to conversing or dealing with a machine. Customers also emphasised the need for human-to-human conversations for enhanced and superior quality service experience (Roy et al., 2020).

The human resources in the tourism and hospitality industry consider robots and artificial intelligence as their competitors as the evolution and improvements in technologies allow machines to replace humans. However, the tourism and hospitality industry has its roots in the human touch and human-to-human

conversations. Research has shown that customers sometimes find interactions with robots and chatbots frustrating because of their inability to provide solutions and answers to specific questions. Finally, they have to rely on some human interface that can listen, understand, and solve specific problems (Ivanov, 2019). The business and society are both observing digital transformation with time and evolution, but digitalization emerged as a necessity in recent years considering the COVID-19 pandemic. The altered world adopted a new style of functioning where there is no face-to-face interaction, and even the human touchpoints are avoided. Ultimately, the digital transformation and the online world became necessary for human existence without compromising the socio-economic functioning of businesses and societies (António & Rita, 2021; George & Paul, 2019).

Technological advancements make life easy, and the need for time to develop integrated models whereby artificial intelligence, robots, and machines can work together with human employees. The objective should not be replacing or substituting humans with machines but instead introducing machines as a supportive mechanism to human employees. Machines may help reduce work stress and human errors in the process, but it may not provide the hospitality factor based on human-to-human interactions (Drexler & Beckman Lapré, 2019). In one of the studies conducted in India, Roy et al., (2020) found that customers prefer human interaction and human presence during service delivery and over-emphasis on the usage of artificial intelligence mainly through robots and AI with human-like features, may not be liked by the customers, in fact, it negatively impacts the customer experience. Therefore, the usage of technology, artificial intelligence, and robotics in the tourism and hospitality industry should be carefully designed and introduced in a supporting role and not as a substitution for the industry's human employees.

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96

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Chapter 7
Artificial Intelligence as an Emerging Technology in Global Trade:
The Challenges and Possibilities

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ABSTRACT

With Industry 4.0 and now 5.0 technologies, the entire globe is embracing these changes. Artificial intelligence-powered systems have immense potential to eliminate international geographical barriers and prove to influence global trade worldwide. The present study highlights how AI increases productivity, economic development, and provides international trade with new horizons. The global value chains, prediction of future trends like changes in consumer demand, risk management, supply chain links are some of the key applications of AI in the sector. AI empowers international trade negotiations to analyze economic trajectories of negotiating partners, adjustments of trade barriers at different rates and scenarios. The chapter will cover the support of AI to access global trade data, its response to diverse challenges, international expansions through digital platforms, support in translations, mechanism of demand prediction, automation of administration with increased efficiency and utility, smart manufacturing, barriers, and influences.

INTRODUCTION

The science of generating intelligent machines is known as artificial intelligence and it is touching all facets of human life from medicine to healthcare, environment, climate, education, security, trade, global services, and global trade; hence every sector would witness improvement with launch of number of AI based machines. AI can solve the difficult and unsolvable problems, but to make that a successful process, human involvement is required. There is still lack of any common opinion that what extent the social norms and ethical principles be followed in Artificial Intelligence now. It is utmost essential that ethics become vital part of human behaviour. There may be serious concerns on security, privacy and ethical concerns, which may draw lot of attention.

AI and Industry 4.0 with new tools and processes is one of the highly accredited Industry revolutions. Recent intelligent computing such as artificial intelligence (AI), big data, blockchain, drones, robots, augmented reality,, 3D technology printing, the Internet of Things (IoT), 5G, and biometrics are already changing the way people produce and provides a mechanism, as well as the relationships between logistics networks and society as a whole (Wamba et al,2021).The requirement of an extraordinary platform of system integrations within organizations, smart investments between partners for future collaborations based on data sharing, labor and capital market reforms, all are attentions of experts worldwide. It has been forecasted that the various activities in direction of Industry 4.0 are going to be the main drivers behind economic, industrial, technological and industrial revolution for global markets in near future. Every country in the world must build a technology-based economy and culture to be sustainable in the twenty-first century. This necessitates a society and infrastructure capable of both generating ideas and converting a significant portion of them into new business opportunities. Business, money, and a higher standard of living are the incentives (Sanchez,et al,2007).

Socio-economic effects of digital trade and AI are transforming global trade. The facilitations of new development models, reduction in geographic barriers are ushering new phase of globalization. The new era of globalization and global trade driven by AI would be more focused on services. The AI powered technologies are proving influential to have their applications in International Trade in the following areas,

- *Global Value Supply Chain*
- *Digital Platform based trades*
- *Trade Negotiations*
- *Data Management*
- *Language Barriers*
- *Source code for Investment purposes*
- *Intellectual property protection purposes*
- *Good trading*
- *Maintaining Privacy Standards*
- *New Range of standards*

Value Chains on Global Platforms: Artificial intelligence is already having an impact on the growth and extension of world trade. It has got wide application on predicting future trends, customer data, customer demand and future forecasting sales management for better handling supply chain systems. Artificial intelligence, of which everyone is being used to work on a broad range of problems, including suggestions for products and customization, Order shipment delays and inventory shortages are

avoided because to pricing strategies, large production tracking, and order distribution inefficiencies, input gathering for customer and economic development apart from supplier regulation, is one of the most radical technologies for the global value chain (Oosthuizen,et al,2020). Businesses can be helped by AI in the global trade in field of,

- Warehouse Management
- Inventory control
- Efficiency improvement of just in time operations
- Delivery schedules
- Warehouse Data Management
- Management of dispersed and complex business units

Packing productivity and efficiency for inventory inspection can be enhance through Robotics , hence the system empowers maintenance of valuable supply chains. The smart manufacturing, Industry 4.0, IoT's, Cyber physical securities are integrating backward forward supply chains all over the world. The results of this can be seen in predictive production, small batches manufacturing, end to end communication among stakeholders. Such developments are strengthening AI based global value chains.

Digital Platforms based Trading: Digital platforms have offered unprecedented opportunity to global companies to expand their horizons. Fintech firms are implementing Artificial Intelligence in their numerous projects and services to achieve the mission of Economic development through digital technology, which would be to make sure that low developing countries, the elderly, women, young population, and low scale enterprises have exposure to the mainstream financial market in trading (Mhlanga, D. 2020). This has proved to an extremely useful tool for small companies to go global, for example in US 97 percent of business is on e-Bay Export, only 4 per cent through offline. Digital networks are becoming even more powerful as drivers of international trade thanks to AI-developed translation services.

Trade Negotiations

Artificial Intelligence has the ability to advance the results of international trade deals as well. For instance, Artificial intelligence (AI) could be used to improve assessments, each negotiating partner's economic trajectories under numerous circumstances assumptions, such as trade-related outcomes (growth paths under various types of trade regulating mechanisms and the way these outcomes are influenced in a collaborative environment. Due to the rapid growth new age technologies, there is a lot of study going on right now on self-contained trading mechanisms (Greding et,al 2000). Multi-attribute negotiation is an imperative as well as stimulating research problem in current scenario (Jenings, eta l, 2001).

Global Trade Data Management

Trade obligations to free flow of data around the world, would enable AI to evolve. To test AI systems, large amounts of data is needed. In the real world, a real-time AI system must monitor a massive amount of data. (Washington & Roth,1989). Access to current data and information may be required to build AI systems that can adapt to a variety of experiences and population groups. AI can produce a vast amount of data that can be used for city residents' protection, efficiency, and content applications and services. (Gharaibeh,et al,2017).To provide a simple example, developing speech-to-text recognition, It can recog-

nize local dialect and accent, as well as words that aren't commonly used. Furthermore, the progression and application of AI is based on other emerging technology like cloud computing, Internet of things and big data systems. These technological advances depend on international data flows as well. It is critical to invest in next-generation technologies to ensure the global drug supply chain's future security and integrity (Mackey et al,2017).

Language Barriers

Reliable translation services are some of the features that can be banked upon by Artificial Intelligence systems apart from connectivity facilitation, miscommunications reduction and to streamline international mutual relations. The much more complicated strategic challenge for creators of innovative artificial intelligence systems is persuading others that their software is more than a representation of their own innovation (Jennings,2010). The enhancement in revenues up to the extent of 35 per cent has been witnesses with the use of AI translations in industry. Today's AI systems are woefully lacking in the core of human intelligence: understanding and understanding the nature of the contexts we perceive (Somaya and Varshney, 2018).

Source Code for Investment Purposes

Since AI is based on algorithms, it is possible to condition accessibility to markets on having accessibility to markets. Otherwise Another roadblock to AI progress is the requirement of source code access as a condition of funding or market access.

Intellectual Property Protection Purposes

The advancement of artificial intelligence (AI) poses questions of intellectual property rights(IPR's) and Implications for international trade. As previously mentioned, many input data are required by it, which can be copied or edited. This could result in the unauthorized plagiarism and protection mechanisms, depending on how this data is obtained. The current structure is woefully inadequate to deal with the growing usage of powerful artificial intelligence systems to create intellectual property rights like patents. It investigates the numerous claims of interested parties to such rights before launching a legal personality to which such rights may be awarded to settle concerns. (Davies,2011). Many other countries lack air use exceptions or comparable copyright versatility.

Global Goods Trading

While much of AI development is based on data, similarly the standards and intellectual property access to products also have an impact on AI development globally. CPUs are an essential piece of hardware in Deep Neural Networks. As a result, global CPU trade is required for AI production. This highlight the significance of tariff reductions in facilitating access to the technologies required for AI growth. In today's modern world, a growing amount of blockchain projects are upending conventional business models throughout every industry[Chang,et al,2020].

Maintaining Privacy Standards

In trade agreements, cross-border data flow commitments are contrasted to the potential of systems to limit data flows in order to achieve valid social goals. Personal confidentiality, which encompasses cross-border electronic information transfer and personal information security, is one of the most politically challenging issues which is not only sensitive but technical as well. States are sorting out how to deal with the issue of state accountability about something that doesn't honor their territories while also allowing for 21st-century collaboration (Wolfe 2019).There is hardly any essential compromise between Artificial Intelligence development and confidentiality protection. The biggest trial would be to enforce privacy laws that do not implement undue limits on data access. Increased influence over human behaviour, with governance expanding into the domain of moral behaviour and further loss of privacy, seems to be one of the greatest impacts of AI (Roberts, et al, 2021). As the trade rules will help by compelling data-importing countries to safeguard the protection of personal data, this could be addressed by accelerating the concept of universal regional and global privacy standards.

New Range of standards

The adoption of Artificial Intelligence in global trade would necessarily require the development of new range of standards. Considering self-driven vehicles, which would necessitate a variety of technological, safety, and automotive manufacturing specifications. For foreign producers the enhancement of sustainable domestic standards across countries would increase costs.

Industry 5.0 and Global Trade

Industry 5.0 is an incremental, progressive (but vital) development that builds on Industry 4.0 concept and techniques. The four previously underestimated imbalances in the Industry 4.0 design under global innovative governance frameworks is relevant with the major goal of Industry 5.0(Ozdemir and Hekim,2018). It is widely acknowledged that past industrial revolutions saw paradigm transformations in the global trade due to the introduction of robotics and automation. As a result, it's possible that the Industry 5.0 revolution may usher in a comparable transition in standards and fundamental regulations in our approach to global trade(Doyle and Kopacek,2019). The global economy is facing tremendous problems because of a pressing need to boost efficiency without displacing human labor from the national economy. A system like Industry 5.0 is necessary, in which robots are entwined with the human brain and act as contributors rather than opponents(Nahavandi, S. 2019). Because of its physical, technological, and genetic interdependence, Society 5.0 restores the splendor of human civilization, and spiritual dimensions, in this case religion, will once again precede science. The impact of the industrial revolutions 4.0 and 5.0 is a far more global society wherein national borders appear to have vanished; in fact, it will be difficult to resist the admission of foreign societies through morals, culture, and national identity. As a result, outstanding Human Resources are critical to breaking through and becoming a leading nation in dealing with and responding to globalization(Tedjosaputro,2019). Industry 4.0 and more recently, Industry 5.0, are there to stay, bringing artificial intelligence, robotics, big data, and other technologies at the life of mankind in a world where everything can be connected and society must respond(Tavares,et al 2020)

Considering above, it can be summarized that the practical implication of Artificial intelligence (AI) has the potential to alter international trade or the transformative impact on International trade. Specific

applications in fields like data analytics, Negotiations, Intellectual Property Rights, digital trading and translation services are already lowering trade barriers which is helpful in various trades.

INVESTIGATION GOALS AND APPROACH

The investigation goal for the study was to find the extent to which Artificial Intelligence has started gaining importance in International Trade . Apart from that it was also to examine that going forward what would the different opportunities and challenges that Artificial Intelligence would be facing in global trade or vice versa. In addition, the application, utility of same was studied in various sectors to explore it more.

To fulfill the said objective, two step protocol was used to find appropriate work. The additional work was studied by:

- Exploring digital study of previous works and literature available.
- Checking references in identified works for additional works

The work's explore term was " Global Trade", "Artificial Intelligence" and " International Trade", all of them were looked up in Google Scholar, Science Direct, Wiley, Web of Science among other research works. Because of expensive coverage, Google Scholar was covered for most of the information and previous literature.

STUDY OBJECTIVES

The study was done keeping into consideration the four research questions described as under:

RQ 1: To study the influence of AI in global trade
RQ2: To study the sectoral penetration of AI in global Trade
RQ3: To study the opportunities with possibilities of AI in Global Trade
RQ4: To study the Limitations, challenges and difficulties for AI in global Trade

REVIEW OF LITERATURE

In global trade era, to study the influence of Artificial Intelligence is the time of need. Understanding and anticipating future trade patterns is very important for decision-makers in decision making inside and outside the country because trade has such a significant impact on employment, production, pricing, and wages.

Batarseh, Feras and Gopinath, Munisamy and Monken, Anderson(2020) are discussing about traditional economic models that they strive to be accurate predictors, they investigate whether Artificial Intelligence (AI) tools could help policymakers make better forecasts and linkages. They also go through how to use contextual AI to analyze trade patterns that have been disrupted by extreme events like trade wars and pandemics. It's tough to overstate how important open government data is.

103

Goldfarb, A., & Trefler, D. (2018). To begin, a comprehensive understanding of AI's worldwide elements is necessary.In terms of scale and expertise, they recognized the key elements of AI technology. They discovered that there are no models available. They also include the specific scale and knowledge features that are empirically relevant for AI in their study. Then they use these characteristics to (a) make some ideas for what an appropriate model would look like, and (b) draw policy implications. This leads to high-level policy considerations. It can be used, for example, to evaluate recent ideas by AI expert Geoff Hinton and others on the possible benefits of public expenditures in AI. According to them, these models were not fine-grained enough to directly capture real regulatory challenges such as privacy policy, data localization, technology standards, and industrial regulation that occur "beyond the border." They also discussed the effects of several behind-the-border measures on AI and their implications for comparative advantage and trade agreement formulation.

(Gilchrist, 2016) explains the manner which businesses must adapt to the concepts of the Industrial Internet and its related issues, they involved and realize the company's latest position with respect to their processes, procedures, philosophies and strategies. Focusing on the millennials (Črešnar, and Jevšenak, 2019) argue that millennial is more tended towards the values connected to their personal growth and anxiety freedom and openness to change.

Smirnov, E. N., & Lukyanov, S. A. (2019), discussed the importance that has arisen as a result of the recent economic slump, structural changes, and global economic imbalances The necessity to build a new economic foundation for successful enterprises and countries to compete in the global market has risen dramatically. As a result, they set out to discover crucial metrics, trends, and roadblocks to the market's growth. Artificial intelligence (AI) as a field of economic research is gaining in popularity among scientists. As previously noted in the context of specific industries, such as the automobile industry, the usage of AI is constrained by natural constraints. In certain developed countries, the adoption of AI is linked to calls to increase the competitiveness of their social and economic development models, as well as low growth rates. The worldwide artificial intelligence market is in a period of transition, with new opportunities for improved goods production and worldwide economic growth. At the similar timings it has been observed that rising international trade protectionism disrupts global value chains and hinders the spread of new technology, resulting in lower productivity. As a result, effective international collaboration tools are required to preserve prior successes.

The study by (Savinov, & Taranovskaja,2020). looks at the birth and establishment of a new segment of scientific and industrial organisations' inventive operations in the global economy, as well as the ongoing efforts that are leading to the development of artificial intelligence. The most promising areas of AI research have been identified. The authors examine the impact of artificial intelligence on international trade, focusing on its application in production and sales collaboration, worldwide supply chains, and the development and operation of digital trading platforms. In addition, the need for developing universal standards and approaches to intellectual property protection is mentioned.

Korinek, A., & Stiglitz, J. E. (2021). Studied the Progress in artificial intelligence and related kinds of automation threatens to undo the advantages that poor countries and emerging markets have made by integrating into the global economy during the last half-century, thereby exacerbating poverty and inequality. They also talked about how new technologies tend to save labor, resources, and create winner-take-all dynamics that benefit developed countries. The authors next examine the economic factors at work in these trends and propose solutions to reduce the negative impact on developing and emerging countries while maximizing the potential benefits of technology advancements.

Cummings, M. L., Roff, H. M., Cukier, K., Parakilas, J., & Bryce, H. (2018). They have concluded from their study that it seems safe to expect that artificially intelligent systems will not be able to take over decision-making at the highest levels. Artificially intelligent systems, on the other hand, will become a larger part of the framework in which human decision-makers function. Because this transformation brings both enormous opportunities and significant threats, it is necessary to assess the potential consequences early on.

Aaronson, S. A. (2017). While the European Union has made a significant first step toward creating a digital single market and promoting public debate, member states have yet to agree on laws that properly oversee data transfers and artificial intelligence in trade agreements with other countries. Policymakers are afraid that other countries may try to weaken Europe's approach to protecting people' privacy and empowering citizens to challenge AI use.

Guo, S. (2020, November). The employment of artificial intelligence technology in international trade finance is the focus of this essay. Their study proposes two types of improvement strategies to address the deficiencies of Artificial Bee Colony (ABC): to improve the convergence accuracy and operational stability of ABC, he proposes an improved artificial bee colony algorithm, and also proposed a hybrid artificial bee colony algorithm with predictive selection ability, which they tested using 23 benchmark optimizations.

Koranne, S., & Sandhu, S. (2021) explained that because of the competitive climate and worldwide trade, the tourist and hospitality industry has long embraced digital technology, with many functions having been digitalized. The travelling guest leaves digital footprints across various aspects of tourism, resulting in a massive amount of data. Customer happiness has long been a priority in this business and delivering effective service solutions is critical to success. Artificial Intelligence is used to explore and analyze guest data, as well as to support decision-making. Through an empirical study and descriptive analysis, the effectiveness of AI across various tourist and hospitality roles is studied.

As per /(Irion & Williams, J. 2020)The amount of cross-border trade in digital services that use applied artificial intelligence in their software architecture is growing all the time. As a result, artificial intelligence now falls under international trade law, including the General Agreement on Trade in Services (GATS) and current WTO negotiations on trade-related aspects of electronic commerce. To avoid disastrous outcomes, an equilibrium between mankind and AI, standards, and a universal legal framework must be formed. The advantages of AI are immeasurable. For a prosperous society, the expanding use of AI must account for the fact the safety precautions basics (Bhushan, 2021). On the other side (Castro, & New 2016), have views that AI can assist organisations that generate social value gain insights, develop innovative new products and services, and boost productivity in almost the same way that it can helps companies make better decisions, develop creative new products and services, and improve productivity.

AI will benefit all the industries in trade, but ones will likely profit the most are, information and communication, manufacturing, and financial services. AI will need to be considered as a possible transformational leader in every industry's capital, creativity, and economic and social development strategy(Plastino & Purdy 2018).

The employment of Artificial Intelligence application stack based on intelligent micro allows the integration of various global supply chain process operation the goal of stock reduction. Furthermore, where items have unexpectedly high demand and short product life cycles that requires agility, there will be further savings from reduced stock - outs and depreciation. In consideration of the significant role of internationalization and the accompanying potential for increased, quicker, and more flexible connectivity, a paradigm is required to allow any corporation to quickly establish itself, make the best use of existing

systems, and operate efficiently with minimal funding, argue Dias, et al 2009. Emerging streaming systems have the capability to change how and where activities are conducted and organised inside GVCs, as well as who captures the wealth created within those chains. Although Industry revolutions are still in their early stages, their effects are already having an influence on the shape of competition and company strategies in a multitude of sectors(Strange & Zucchella,2017). As per Stapleton,2019). Countries that having a similar language trade far more than someone who does not, as a result, AI-assisted translation services can facilitate commerce and make it easier for businesses in affluent countries to outsource labour to workers in developing countries. Companies can now connect with workers all over the world using online freelance platforms. Further he adds that, this enables companies to outsource a wide range of tasks, including software development, graphic design, writing, data entry, and administration and the reasons that affect and lower cost of factory automation are having an impact on Global Value Chains and overall global trade. Recent technological breakthroughs in robots and AI are predicted to resume, and technological advance will always operate like a double sword, replacing certain tasks but also creating new ones. Many of emerging markets' exports are routed through Global Value Chains, which also serve as conduits for emerging technology. According to (Rodrik, 2018),new capacities and productive employment, on the other hand, have so far been limited to a small number of globally interconnected enterprises. Disruptions to the political and economic order caused by artificial intelligence (AI) will result in a dramatic shift in how all countries experience the phenomena of digital imperialism. Concerns about the potential hazardous uses of AI in global trade include the possibility that it will eventually render people obsolete, that it will be used to target specific segments of their population, or that it will be used to expand cyberattacks and the physical intimidation attacks globally through trade, and that it will be utilised invade an individual's privacy, social manipulation through spying, subterfuge, and deceitful, argues Feijóo,2020.

Civelek, M. E., & Artar, O. K. (2019). Have discussed the introduction of blockchain and artificial intelligence technology and predicted that they will put an end to old foreign commerce procedures. These technologies will also lead to the formation of balanced trade unions throughout the world. Their study focuses on the definition of an intelligent trade matrix, which suggests that it will allow barter transactions between two countries without incurring any customs duties.

Meltzer, J. P. (2019). Have discussed that Artificial intelligence is already influencing how economies grow, create employment, and trade worldwide. While the United States is at the forefront of AI development, other countries realise the technology's potential and have developed their own initiatives to encourage AI investment and development. China, the United Kingdom, and France, for example, intend to enhance AI research and development spending, as well as education and skills development, to grow the pool of people capable of contributing to AI. The United States and the European Union both recognise the need for AI ethical guidelines. Some AI initiatives have also emphasised the importance of worldwide AI collaboration. In addition to increased regulation in areas like AI ethics and data access, creating an enabling environment for AI will necessitate new legislation. In other circumstances, current laws, and regulations in areas like privacy and intellectual property will have an impact on how AI evolves. A global agenda is also required to assist the creation of acceptable AI regulations as well as AI-related economic and societal outcomes. Any effective solution should avoid a tangle of regulatory approaches that obstruct the progress of AI and the global spread of AI goods. This AI primer discusses the economic and trade prospects presented by AI, the critical role of regulation in promoting AI, and where international cooperation is required to optimise the economic and social benefits of AI.

Yan, Z. (2020, November) had explained that the foreign trade firms' economic benefit growth and market competitiveness are aided by supply chain management. Most international trade companies are still exploring their grasp of supply chain management without building a complete system, according to various information data. Enterprises should aggressively implement various high-end technical means, establish scientific and technological systems, and then strengthen their core competitiveness in the context of artificial intelligence (AI) technology. Companies can do autonomous research and development to collect varied data and information, perform scientific reasoning, solve some economic difficulties, and broaden the scope of commerce. They have concluded that in the current market environment, foreign trade companies should actively innovate supply chain management models and also there is a need to introduce AI technology, clear production and logistics procedures, taking into consideration the computer automation control, and promote the sustainable development simultaneously

(Wamba,et al,2020), has stressed upon usage of artificial intelligence (AI) technological advances by businesses in order to adapt to or disrupt their ecosystems while building and optimising their strategic and competitive advantages. The ability of AI to streamline existing processes and increase automation, information, and transformation impacts, along with detect, anticipate, and interact with humans, demonstrates its full potential.

ANALYSIS OF RESEARCH QUESTIONS

RQ1: To Study the Influence of Artificial Intelligence on Global Trade

People's well-being is anticipated to improve trade because of the advent of innovations like Artificial Intelligence. However, the negative repercussions could include increased inequality, the extinction of some professions, and social marginalisation. Despite great advances in comprehending the algorithm and the characteristics of AI, humankind is still unaware of the global implications of adopting this technology. Under international accords, a few governments are now negotiating AI regulation. Until now, cross-border data and information transfers have been managed by WTO regulations enacted before the Internet's widespread adoption.

Countries are currently attempting to manage these issues through local and bilateral agreements. As a result, the revised NAFTA and CPTPP formats (revision of the Trans-Pacific Partnership) have separate sections devoted to the control of cross-border data flows, user data privacy, and artificial intelligence regulation.

There are certain question arises that how will artificial intelligence influence the world trade?

The first area where AI will influence global trade is in the supply chain. The entire process of logistics also i.e. from online ordering to delivery of goods to the final consumer is provided by data, to which machine learning technology can be applied. Such programs help to predict the likelihood of force at certain stages of delivery, analyse consumer behaviour to optimize warehouses and storage facilities. Also, AI can build the fastest and most optimal delivery routes for delivery of goods.

Other area is of control compliance. The problem of conducting trade in modern conditions is the occurrence of a huge number of contract terms, legislative acts, and other regulations, which are regularly and rapidly changing. For this companies monitor all the changes occurred and try to control over the whole process of supply chain (delivery of goods to the final consumer). There is software that is used for these purposes but involves certain errors. Hence, it is required to apply additional control by

competent employees, which incurs additional costs. The application of AI enhances the effectiveness of such programs and decrease the need for human control of all business processes of the manufacturer.

Managing a business entails signing a big number of contracts, which takes a significant amount of time, effort, and money. Because contract conclusion is linked to legal difficulties, paperwork, and other parameters that AI utilising machine learning can automatically resolve and submit a final document, these cost elements can be greatly lowered with the development and application of AI. It's also critical that the interests of both parties are treated equally in the competent work of artificial intelligence (Matveev, Sviridov, Aleynikova, 2008). This system can be integrated with the manufacturers and buyer's payment, delivery, and shipment schedules, further reducing the possibility of conflicts and lawsuits.

Financing is another area where AI has been shown to be profitable. Before giving a trade credit to a firm, the bank does different assessments to determine the company's solvency and financial position. Due to non-compliance with the requirements, contract terms, and other issues, many of them are unable to obtain loans. Banks, on the other hand, must keep a full crew of analysts and compliance control specialists on hand to avoid loan defaults. Artificial intelligence can be assigned the responsibility of avoiding loan defaulters, which will save banks money and shorten the time it takes for enterprises to assess applications.

Cross-border goods movement, such as export and import, necessitates the usage of goods classification systems (for example, the harmonised HS system). It is critical for exporters and importers to properly classify and code their products for tax purposes. This is done by highly qualified specialists in the exporter's description of the items. This procedure takes a long time to complete. The application of artificial intelligence (AI) in this field can drastically cut expenses and save time when it comes to completing essential trading procedures. This technology is in use right now. Typically, this activity is carried out by highly qualified specialists who are compensated well. AI can compete with humans.

Figure 1. Trade shows signs of rebound from Covid 19
Source: WTO Press Release2020
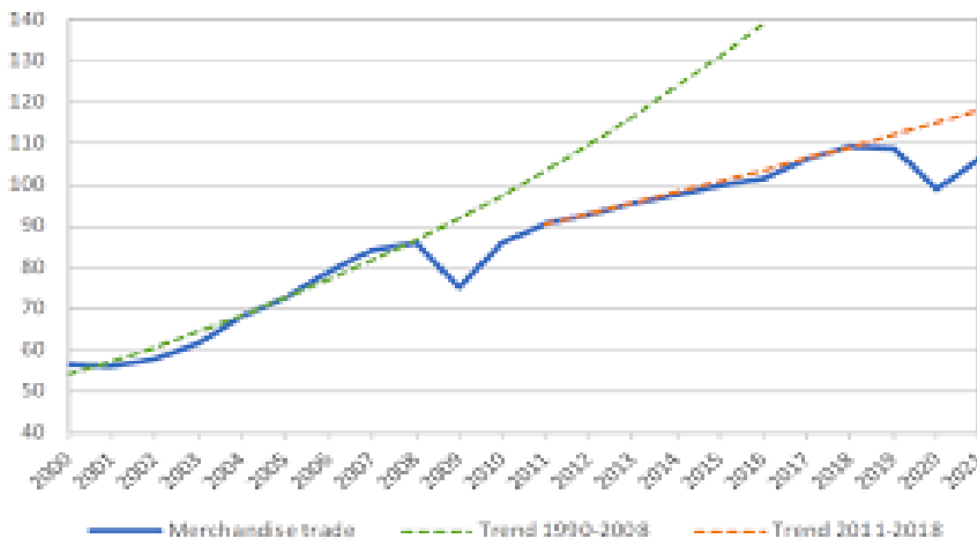
World trade is showing signs of recovery from a profound COVID-19-induced depression, but economists at the World Trade Organization warn that any rebound could be hampered by the pandemic's persistent consequences. Fig 1 shows the World merchandise trade volume and also shows the decline and growth in different period .Once pent-up demand has been met and business stocks have been replaced, the rate of expansion could decline dramatically. If COVID19 resurfaces in the fourth quarter, more unfavorable effects are probable.

RQ2: To Study the Sectoral Penetration of AI in Global Trade

Artificial intelligence (AI) is revolutionizing the way we live, work, travel, and do business in the twenty-first century, from driverless automobiles to virtual doctors. The industries which are estimated to gain in global trade through Artificial Intelligence are:

Figure 2. Sectoral penetration of AI in global trade
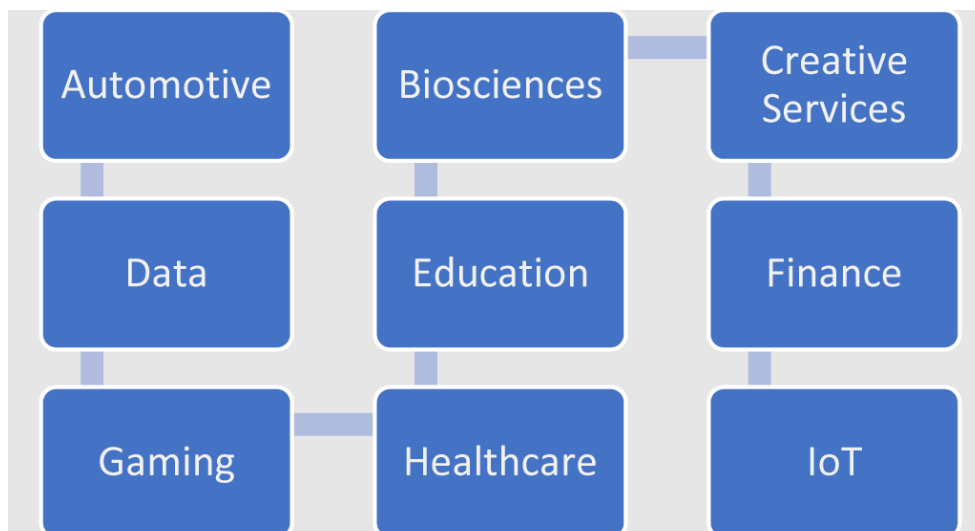
The above figure depicts the various sectors where AI has penetrated its roots, like Automotive, Biosciences, Data Analytics, Healthcare, Education, creative sectors, Finance, IoTs and Gaming. Apart from these there are other secondary fields where the application of AI are unlimited in International Trade. The implementation of a new machine translation technology has resulted in a 10.9 percent growth in foreign trading. In addition, the benefits of heterogeneity therapy align with a significant translational cost reduction(Smith and Anderson 2014). AI can help with information flows by making cross-border trade more efficient. Cross-border e-commerce accounts for around one-third of digital data flows, and AI technologies could account for 30 to 40% of digital commerce. According to some estimates, AI-based recommendation engines account for 30 to 40% of sales on major e-commerce sites(Brynjolfsson et al, 2019). AI can also help to accelerate worldwide trade volumes by enhancing efficacy of supply chain and decreasing difficulties of worldwide contracts, classification and trade compliance. Transparency and supply chain efficiency improvements can help businesses create greater trade finance by alleviating

banks' concerns about compliance issues. Banks may utilize AI to review trade documents, classify and classify them correctly, and identify risks in a far less time-consuming manner.

The use of cross-border data in flows other than commerce, which can increase the performance of AI solutions and, in turn, improve the productivity of local activities, is how AI creates impact from global flows. By monitoring travelers' information searches and travel patterns, online travel companies in one nation can provide customized engagement and services in another country. In the entertainment industry, global data flows can help chatbots, news aggregation engines, and recommendation sites work better, encouraging increased content consumption. Because AI helps economies become more productive, the increased production from efficiency improvements and innovations may be passed on to workers in the form of pay and profits to entrepreneurs and businesses. (Bughin,,et al,2018). Reduced trade costs, digitization of commerce (shift from products to services), increased use of digital inputs (services) in manufacturing, and a movement in comparative advantage towards more capital plentiful countries are the major processes by which these technological developments are likely to effect trade.

RQ3: To Investigate Opportunities of AI in Global Trade

As stated in report of ITU News, June 2018 on "How Technologies are changing the global trade" there is high discussion on risk of a trade conflict, counter tariffs and the global trade orders. While critically, these concerns ignore the regulations of international commerce: how the 4th Industrial Revolution's creative technologies are revolutionizing commerce and trade by making operations more inclusive and efficient. The global trading system is no newcomer to technological change. More recently, technology such as Optical Character Recognition (OCR) for reading container numbers, RFID and QR barcodes for identifying and tracking shipments, and basic digitization of trade documents have increased the international trade's accuracy and availability.

The following are the five technologies that will cause global trade disruption:

Figure 3. Upcoming artificial intelligence opportunities in global trade
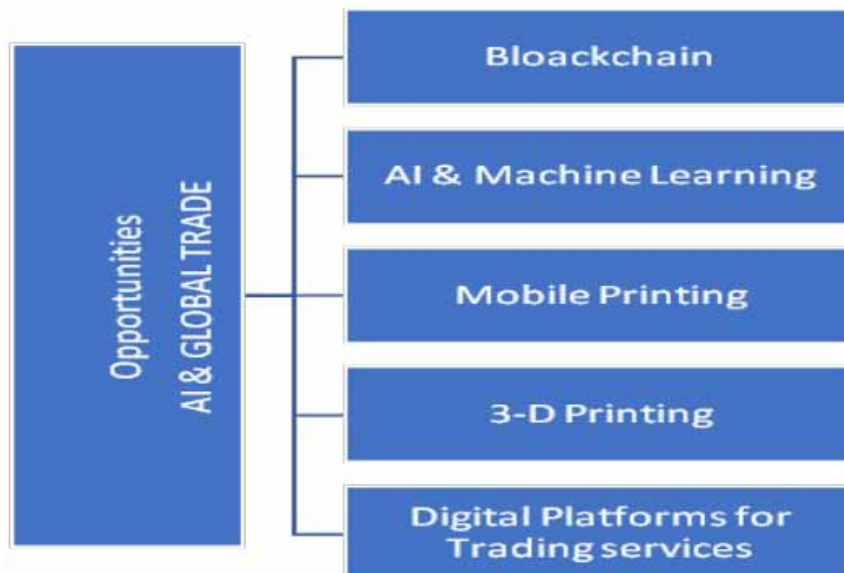
It has been very well laid down in figure 3, that Block Chain, Machine Learning, Mobile 3-D Printing and various platforms for digital trading services are some the most recent and upcoming Artificial Intelligence opportunities in global trade. In many ways, globalization has made the world smaller, and there are many preferences for international items. However, perishables transportation across sites is a difficult task due to logistical risks such as perishability, damage risk, temperature differences, and transport shocks, among others[Mahajan,2016].The breakthroughs among industries across the public-private sectors will rise at a faster rate in the coming decade, thanks to the annual increase in AI companies(Kakani,2020). Digital technological advances have the potential to drastically alter our energy supply, trade, and consumption(Ahmad,et al, 2021). According to McKinsey, AI could boost global output by 16 percent, or $13 trillion, by 2030. The influence of AI on 12 industrialized economies, including the United States, suggests that by 2035, AI will have doubled yearly economic growth in these countries. Firm competitiveness will rise as AI increases productivity growth, opening new options for international trade. AI legislation has the potential to be a trade barrier for AI products. In many cases, AI will be incorporated into a tradable product, such as autonomous vehicles, planes, the Internet of Things, and AI-based services. When each country creates its own AI standards, it might lead to regulatory heterogeneity and increased costs for exporters(Meltzer, 2019).). Digital technologies can lower trade and transaction costs, such as those associated with discovering and negotiating a contract, demonstrating conformity with standards, and rapidly and efficiently transporting products across borders(Jouanjean, 2019).

Design, manufacturing, sustainability, and resilience are just a few of the product lifecycle concerns that may be addressed with AI-enabled digital transformation. Increased connectedness, openness, and visibility across digital supply networks emerge from the implementation of AI-enabled solutions. As a result, the reactivity and robustness of complex global digital supply networks improves. (Wuest,,et al,2020)

The annual global revenue for artificial intelligence products and services is expected to grow from 643.70 million in 2016 to $36.80 billion by 2025, a 57-fold increase over that time., as per the information available. Artificial intelligence (AI) has applications and use cases in practically every industry vertical and is regarded as the next significant technology upheaval, analogous to the industrial revolution, computer age, and smartphone revolution. Even if that bit of hyperbole is ignored, artificial intelligence has the potential to disrupt a wide range of companies, government activities, and consumer behaviour. In its analysis, Tactica identifies 27 verticals that are utilising or will be employing AI technologies. Financial services, healthcare, defence, consumer retail, advertising, and media and entertainment are just a few examples.

For decades, AI has been used to create Decision Support Systems and has proven useful in generating knowledge by translating raw data into usable information. Companies benefit from AI by automating administrative, financial, and bureaucratic procedures through Robotic Process Automation, assisting managers in making decisions, and, finally, boosting employee(Andrea and Mauro 2021). Specifically, the opportunities that Artificial Intelligence can create in global job market are,

Figure 4. AI impact on global job market
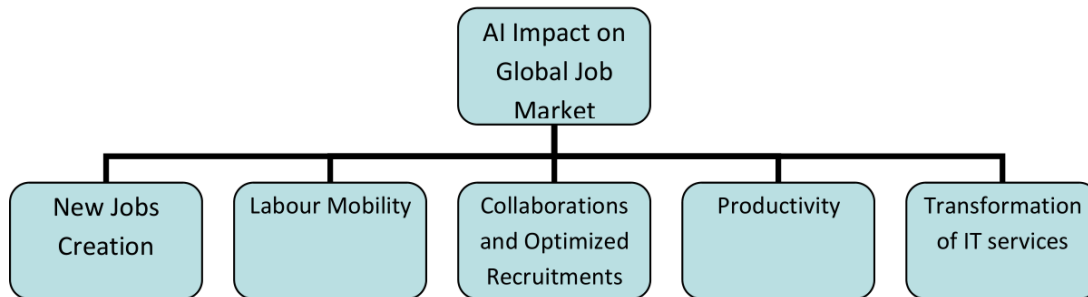
RQ 4: To Study the Limitations, Challenges and Difficulties of AI in Trade

Businesses are experimenting with new ways to use artificial intelligence (AI) technologies to boost productivity, profitability, efficiency, and overall business results. Along with the advantages, there are some obstacles, difficulties, and problems that must be overcome and kept in mind for future progress. There are certain restrictions as well.

Limitations of Artificial Intelligence in Global Trade

The availability of data is one of the most significant obstacles to AI implementation in the commercial world. Data is frequently inconsistent and of poor quality, posing a difficulty for firms attempting to derive value from AI at scale. To overcome this obstacle, you should develop a clear strategy for obtaining the data that your AI will require from the start. Another issue with AI adoption is a scarcity of skills and the lack of technical people with the requisite experience and training to effectively develop and run AI technologies. According to research, experienced data scientists, as well as other specialized data workers trained in machine learning, training good models, etc. are in short supply. Another factor to consider when purchasing AI technologies is the pricing. Businesses that lack in-house capabilities or are unfamiliar with AI are frequently forced to outsource, posing cost and maintenance issues. Smart technologies employed in AI can be costly due to their complexity, and additional costs may be paid for repair and ongoing maintenance. Computational costs for training data models, for example, can be an added cost.

Software programmes must be updated on a regular basis to keep up with the changing business environment, and if they fail, there is a risk of losing code or essential data. It can take a long time and be expensive to restore this. This danger, however, is no higher with AI than with any other software development. These dangers can be reduced if the system is well-designed and people purchasing AI are aware of their needs and options.

Some of the blockers that might hinder Artificial Intelligence penetration in global trade market may be:

1. Political or Institutional Hindrances
2. Lack of proper education system
3. Policy planning in backstage

4. Low technology investment rates
5. Poverty, hunger, lack of basic amenities
6. Regulatory constrains
7. Shortage of talent, brain drain

DISCUSSION

The extent to which Artificial Intelligence has boosted economic productivity growth, it will create greater and new opportunities to global trade. AI powered translation systems that help eliminating natural barriers, language difficulties in communication, speech recognition are some of the potential applications of AI in global trade. Blockchain, another important contribution by AI will ease cross border payments, tracking and tracing supply chains and ultimately reducing middleman. IoT system would be another key enabler here facilitating real time decisions and connecting consumers to manufacturers directly. 3D printing, another revolutionizer would change the service-based economy to product-based economy.

Apart from the obvious business hazards, it's worth remembering that advances in AI may, for most of the part, improve business and people's lives. New AI-powered translation systems can erase natural obstacles and enhance international trade, according to an NBER working paper by Erik Brynjolfsson of MIT Sloan School of Management and Meng Liu and Xiang Hui of Washington University (2019). They discovered that the implementation of a new machine translation system resulted in a considerable rise in international trade on this platform, with exports increasing by 10.9 percent. In addition, the benefits of heterogeneity treatment are consistent with a significant reduction in translation costs. The findings of their research show that language barriers obstruct trade greatly, and that AI has already begun to increase economic efficiency in this area.

The long-term usage of internet technology for e-commerce is predicted to lessen inequities, benefiting people who are locked in poverty. For instance, a digital platform could be women's economic mobility vehicle, hence Encoding long-term sustainability through empowerment. In particular, these technologies can be used to make it easier to import and export goods and services by implementing innovative operational models, imposing stricter policies (particularly the integration of tax policies), and accurately measuring the impact using AI in specific locations around the world where illegal trade is rampant. On the other hand, AI has the potential to aggravate the current digital divide by widening the differences between countries. Leaders in AI adoption (particularly industrialized countries and China, which has an aim to become a world leader in AI) may be able to gain a competitive advantage over developing countries. As a result, poor countries may be less motivated to pursue "fashionable" technologies and so lag.

Machine intelligence and robotics with deep learning capabilities have had significant disruptive and enabling effects on businesses, governments, and society. They're also having an impact on global sustainability trends. The present study portrayed the Impact of Artificial Intelligence on Global Trade acknowledging the intrinsic multidisciplinary nature of the domain. The study helps researchers and practitioners understand how the domain is evolving and identify the most promising areas to invest in. The business Managers could use the study to understand the opportunity for improving the standards of global trade. As the world is moving towards the fifth revolution Industry 5.0, the trade is moving towards the directions where limits are endless, and possibilities are limitless. The world is moving towards a future where everything would be interconnected, the technology, people, resources, all will

digitally be joined. We need to build a competitive trade environment globally that is truly sustainable and truly equitable.

STUDY LIMITATIONS AND SCOPE FOR FUTURE

The major drawback of this paper is its base on previously available information; however, the primary data could not be collected for the same. Most of the available data has focused on application and impact of Artificial Intelligence on Global Trade, thus there may be certain level of partiality visible in the study. Further the lack of any cultural, locational, geographical or any industry specific case study. As the Industry is now shifting to Industry 5.0 with more advancements, so there is enormous scope for the elaboration of this study with more industry specific examples and applications which have been applied in international trade scenario. Apart from above, the study can further be diversified into various trade segments taking impact of Artificial Intelligence on each segment with respect to Industry 5.0 concept. Another scope for future study can be adaptation of Industry and technology applications of AI in pandemic constrained world, survival in new normal with reshaping international business for sustainable development. The various scientists, experts and Subject specialist are discovering innovations and new applications of Artificial Intelligence in various fields, hence categorization based on region, territory, socio-economic sector is another area which can be explored. The results can further be based on primary analysis. Shaping an AI-friendly environment for people and a people friendly environment for AI can be a possible solution in direction of Industry revolutions to continue further, creating opportunities with struggle for innovation and Entrepreneurship in global trade volumes, lastly finding shared context of values for both humans and robots.

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Chapter 8
Intellectual Impact of Spiritual Wellbeing, Self–Determination, and Employee Outlook on Industry 5.0

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ABSTRACT

The industrial revolution and advancement in field of artificial intelligence in term of Industry 4.0 has reduced the need of human intervention at workplace. That is why murmur has started around Industry 5.0 where the focus is collaborative interaction between human and machines/robots for sustainable development of industries. The objective of this study is to assess the effects on the well-being of the employees in the dynamic setting through spirituality training. The study includes the detailed analysis of 392 responses collected from employees working in high-tech and high-automated organisations such as automobiles, FMCG, and IT with the help of structured questionnaire. This study might help improve the employee wellbeing and reduce the uncertainty in workforce participation and provide more creative, innovative, and engaging mindset in Industry 5.0. The research results have presented a significant interaction between the employee wellbeing, outlook, and self-determination at workplace in the presence of spirituality training.

INTRODUCTION

Industry 5.0 has been widely discussed due to arise of concerning factors in Industry 4.0 where the technological innovations are at the core of development. The focus of Industry 5.0 is collaborative interaction between human and machines/robots for sustainable development of industries, societies and

people (Kadir and Halil, 2019). The focus of I5.0 is to develop human-centric approach, with resilience and sustainability at its core (European Commission, 2021). I5.0 tranquil approach to harness Big Data and tremendous automation for sustainable innovative ecosystem with responsible science, innovation and human friendly policies can bring a meaningful change in the human and industrial revolution sustenance (Vural & Nezih, 2018). The preconditions of successful I5.0 transition are skilled, healthy and enthusiastic workers (European Commission, 2021). However, the big question is 'How to valorise human capital'. The onset of I4.0 led to a change in work pattern throughout the world. The industrial revolution 4.0 has created much insecurity among the employees. People have started taking work-overload and spend more time on working continuously proving themselves to safeguard their jobs. Due to overload and work pressure, they started ignoring their health and happiness and stress, anxiety, fatigues, hypertension, sleep disorder, lack of contentment etc. have become an integral part of their routine lives (Sauter et.al, Article). The consequences of these factors may affect the employee's wellbeing and escalation of the insecurity at workplace (Ming to et.al (2020).

For successful transition, industries need to focus on many attitude gaps and adapted trainings such as spirituality. The influence of automation and digitalization on employee physical and mental well-being must be considered in new initiatives (European Commission, 2021). Spirituality at the workplace is mainly an individual activity that seeks a feeling of purpose at work. It originates from a person's self -determination. Workers should be aware about the core resolution of their own lives which empowers them to improve their productivity at work place (Karakas, 2010). Spirituality in the workroom produces a healthy work environment where all employees work together in a creative and positive way and this collaboration helps them to achieve better results. Spirituality also aids firms in adopting technology improvements with greater employee enthusiasm and participation (Sadhana Singh, 2019).Employees with high spirit feel more motivated, meaningful and satisfied with their jobs, which eventually make them compassionate about their organization. This compassion helps in promoting organizations, their commitments and vision (Michael Crawley, 2014). High spirituality leads an employee to achieve higher abilities and capabilities. With adequate organizational support such as spirituality training at workplace, employee is able to develop a positive perspective, better able to manage the job, workload, control over job, relationships at workplace.

I4.0 has created more anxiety than eustress, which is necessary for improved recital and execution (Jex, 1998; Cooper et al., 2001) and is very common to well-being and available in different forms at workplace. When employees have clarity and control over tasks, better able to visualize organizational vision and know how to achieve set goals, they feel positively stressed (Hargrove, Nelson and Cooper, 2013). Whereas, if all the essential elements for expected job performance and healthy work environment are not present, employees feel lost due to lack of clarity, information and relevant competencies; employee feel dissatisfied with job, become more anxious, depressed and start taking more leaves leading to absenteeism, lowering down of performance and increase in employee turnover (Josias, 2005 and Locke, 2015). The agenda of I5.0 is to strengthen the health and well-being of employees by initiating wellness programs at workplace. East (2005) discovered that workers who feel spiritually at work have positive attitude towards any work situation. According to research, organisations that foster spirituality see improvements in creativity, contentment, and organisational commitment (Freshman, 1999; Turner, 1999).

In recent years, incorporating spirituality training into the workplace has grown more widespread, owing to the growing popularity of yoga and contemplation in precise (Plante, 2016). The study's overall

goal was to determine the link between spirituality quotient, employee perspective, spiritual wellness, and self-determination.

THEORETICAL FRAMEWORK

Industry 5.0

During the technological advancement phase, every organization desire to boost their efficiency without displacing human employees from the manufacturing business that is offering stern glitch to the global economy. Staying at the top of the business world is becoming tougher as digital technologies change. To counter these glitches, in his article, Nahavand (2019) established the conception of Industry 5.0, in which he proved how robots are in twined with the human brain and operate as collaborators rather than rivals. He also stated that Industry 5.0 will fetch more people back to work and increase work efficiency. Smart self-sufficient systems depend on senses which we human beings employ to work with others and to learn flexibly, according to Wickensentl (2015) & Goodrich et al. (2008).From an industrial market viewpoint, Weber (2016) debated the implications of the possible fourth industrial-digital revolution ("Industry 4.0").Industry 4.0's influence may be able to compensate for the imbalances that arise in the baseline scenario. The lack of vocational training in the business is being rectified. The Duman & Akdemir research (2021) demonstrated that the technological components of Industry 4.0 influence organisational effectiveness.

We live in a digital age, where people's lives have become virtual and digital and it's an example of Industry 4.0 and people are beginning to collaborate with Industry 4.0 and after coming of innovative lean technique in technological age, industry 5.0 apps become more seamless. The lean way to innovation, according to Ozkeser (2018), takes care of the procedures of Research & Design projects under the industry 5.0 platform. Many businesses have begun collaborating using the Lean method approach and Industry 4.0, and this interaction is known as lean industry 4.0, which will eventually become Industry 5.0, where man meets machine in this new world. Industry 5.0 products/services enable people to achieve their core human need to express themselves via the collaboration of man and machine (Demir, Dowen & Sezen, 2019). In I5.0, values and fundamental rights are the binding principles along with autonomy, privacy, dignity and employee's rights. According to European Commission (2021), human and societal aspects need to be the core of any development. It is important to bring interventions that can strengthen the relationship between men and machine to develop a collaborative outlook instead of competitive one.

Spirituality

Spirituality at workplace is a wide miracle and may be inferred in different ways. Spirituality gained admiration in the 1950s and 1960s as a result of the supremacy of humanistic psychology (particularly, Maslow's work). With the self-improvement movement in the 1980s, spirituality underwent a second important transformation (Carette & King 2005).The spirituality interest showed a mushroom movement in the early 1990's from the early 1990's.Organizational consultants relish the fortuitous to provide training to employees on the job (Cavanagh 1999; Hicks 2003; Mohamed et al. 2004; Giacalone et al. 2005; Smith 2006; Van der Walt, Du Plessis & Barker 2006; Marques, Dhiman & King 2007).

The first scale to assess workplace spirituality was established by Ashmos and Duchon (2000), which allows individuals to understand their inner lives through conducting meaningful work in the business. Milliman et al. (2003) went on to say that spirituality shouldn't be about inner life, but rather about aligning with organisational principles (Giacalone & Jurkiewicz, 2003; Giacalone & Jurkiewicz, 2010). Through transcendence in the workplace, they foster individual sentiments of fulfilment. According to Gotsis and Kortezi (2008), many theoretical frameworks study workplace spirituality as a sense of perfection, connectedness, personal fulfilment, and satisfaction.

Petchsawang & Duchon (2009) describes the spirituality of the workplace as friendliness to others, consciousness, an inner conscience in the quest for meaningful work and transcendency." According to Fry (2006) and Matherly (2007), Spirituality of the workplace gives the spirit, drive and sense of importance in the workplace of the employees, which leads to an outstanding opportunity to transform the workplace into something remarkable (Krishnan, 2008).According to Smith (2007), spirituality in the workplace fosters organisation. Change may start in the workplace when businesses starts receptive spirituality in their own employee in terms of emotional stability, physical and mentally approaches spiritual requirements (Dehler and Welsh 2003). Research shows that organisations assist decrease stress, better creations and improve the resolution of problems via their attention of the spiritual part of human experience (Tischler et al. 2002). Many researchers conducted the empirical study and demonstrated that their employees are consistent, committed and with minimal absenteeism when spirituality is recognised and motivated (Chawla & Guda 2010; Komla & Ganesh 2007, Rego & Cunah, 2007; and Pawar, 2009). They also investigated how spirituality at work affects the company culture generally, which demands the employees' devotion and loyalty.

Industry 5.0 and Spirituality

"More than machinery we need humanity, more than speed we need kindness and gentleness" (Charlie Chaplin), besides these lines, Digital innovations in the workplace have brought us riches, but they have also left us in black and spiritual emptiness, according to Safta (2016). In the sphere of management, the idea of spirituality acquired influence. Spirituality has a beneficial effect on employee and organisational well-being. Milliman (2003) examined the general impact of spirituality on people and enterprises. Spiritually, the whole physical, emotional, social and spiritual life of the employee is sensed with serenity and congruence. The Industrial Revolution has brought about perturbing transformations on the physical and digital fields in the King, U. (2011). In this period, the rendezvous of spirituality has a noteworthy role and their involvement to the development of the spirituality framework in the help of industrial revolution (Lappay, 2020).

People working with robots and smart machines are referred to as Industry 5.0.Industry 5.0 promotes individuals to work faster and better with new technology, such as the Internet of Things. Industry 5.0 is intended to combine cognitive computer capabilities in collaborative operations with human intellect and capacities (Article, James Jardine (2020). It has been observed by the many researchers that the changes occurred due to transformation from I4.0 to I5.0. Many employees feel uncomfortable; they take more time to learn the functions of the machine learning which will affect their daily productivity. Overloads have led employees to ignore their health and begin to suffer from stress, etc. Spiritual training boosts the employees' wellbeing both in physical and psychological terms, improves self determination to adapt and accept new technologies and innovation and change their outlook and perspective towards the organisational approach of transforming workplace with advancements (Willis, 2018).The goal of this work

121

is to analyse the effects on self-determination of the spiritually good and the attitude of employees. The study further analyses the impact of employee's spirituality level/quotient on the relationship between employees' spiritual wellbeing, their outlook and self-determination. The below mentioned hypotheses have been framed to study the relationships between variables eventually presenting the assistance of spirituality training in easy adoption of industry 5.0.

Spiritual Wellbeing and Self Determination

Spiritual goodness has to do with the capacity of a person to satisfy his spiritual necessities and efforts effectively (Van Dierendonck, 2012).The spiritual well-being was identified by Fisher (2001) in which he described how health plays an imperative part of individual life. He provides a four-domain model that connects spirituality to well-being and health where each area has two different aspects: knowledge (cognitive framework) and inspiration. Spiritual health, according to Fisher, is a degree in which individuals live in harmony with something else that exists beyond the human level. In addition, Fisher (2011) suggested that difficulties in the four-domain model involving personal, communal and environmental & transcendental ties might impair the individual's health and Ivtzan et al. (2013) has examined how self-actualisation realize people to get psychological happiness and personal growth initiatives in the life.

The employees might feel several kinds of motivation in regard of their job, as determined by self-determination theory (SDT). Lara (2018) revealed that how the benefits of self-determinants theory principles can bring to the workroom and also help employee to generate performance and wellbeing in the workplace.

Hypothesis 1: Spiritual Wellbeing significantly influences Self Determination of employees.

Outlook, Wellbeing and Self Determination

The three main fields of research Smith in terms of well-beings of the workers in the workplace are (Kaminstein&Makadok,1995) - (1) the connection between hazardous workplaces and specific diseases; (2) the relation of stress to working circumstances; and (3) the relation of specific diseases with characteristics and types of work environments. Work pressure according to Glowinkowski and Cooper (1986), can impair self-esteem and raise a variety of psychological issues. Self Determination Theory emphasises individual characteristics which also affect the level of satisfaction of fundamental requirements and the type of motivation shown by staff. Olafsen and Deci (2020) stated that workplace motivation and behavioural results witnessed by the employees' effect the working environment. Internal management of fundamental psychological requirements is viewed as the best motivating source, and not external motivating motivations, such as those which are crucial for strengthening the theory and practise (Shuck B, Peyton Roberts T, Zigarmi D, 2018).Workplace motivation and behavioural results witnessed by the employees' effect the working environment. Internal management of fundamental psychological requirements is viewed as the best motivating source, and not external motivating motivations, such as those which are crucial for strengthening the theory and practise (Shuck, Peyton, Zigarmi D, 2018).

Hypothesis 2: Outlook mediates the relationship between spiritual wellbeing and self-determination.

Spirituality Training to Improve Spirituality Quotient (SQ) at Workplace

Training at workplace is extremely important for professionals now a day at workplace. Training improves the employees' current abilities in working lives and makes them effective and productive and contributes to enhanced performance and production for businesses. Transformation can start at work if organisations start spirituality for all the employees (Dehler and Welsh 2003).Mike Wright, Director of Health and Safety at the United Steelworkers Union (USW), feels the workforce in the United States is "more, not less dangerous," while many companies have improved their workplace health and security training as well as enhanced health and safety programmes (Berry, 1997).Researchers have shown that they have sympathy for others, have a conscious inner conscience in the quest of meaningful job that permits a happy attitude (Petchsawang and Duchon 2008).Spiritual traits are acquired via meditation which contributes to the equilibrium of harmony and balance of existence. In Buddhist mediation, attention refers to a type of focus that can lead to illumination or knowledge (Weick and Putnam, 2006).

Two methods of Buddhist meditation allow people to clean themselves: (1) meditation on tranquilly and (2) meditation on insights (Payutto, 2002).Meditation of tranquillity is aimed at concentration, whereas meditation of insight is intended to get the knowledge and 'see the true essence of life and the world. 'Insight meditation at the workplace is preferable, according to PraRajaprommajarn (2004), as it helps people become aware of or conscious of them thinking and feelings, therefore helping them to deal with workplace stress in their daily lives. Norazlina (2017) assessed the needs to enhance the spirituality development in employees. His findings concluded a significant positive correlation between spirituality with awareness and effectiveness of spirituality trainings.

Plante (2016) noted that spiritual education helps people to understand their own preconditions. There are various resources for improved practise such as workshops, advancements in personalities, webinars, etc. that may allow individuals to increase efficiency and abilities. Spirituality at work is in reality concerned with human actions such as personal growth, learning etc (Petchsawanga & Duchon, 2012; Gull and Doh 2004).People who are more conscious of their job acquire a capacity for sensible action and hence perform better, according to Weick and Sutcliffe (2006). The frequent practise of insight should make intelligent action possible.

Regular practise enables the mind to grow stronger in terms of monitoring and observing distractions. The overall link between spirituality and job performance backs up Duchon and Plowman's (2005) results and verifies a theoretical premise that introducing spirituality into the workroom has a favourable impact on organisational outcomes (Neck and Milliman, 1994; Biberman and Whitty, 1997; Cacioppe, 2000; Pratt and Ashforth, 2003; Kinjerski and Skrypnek, 2004).

Hypothesis 3: Spirituality Quotient of employees moderates the relationship of overall health, outlook and self-determination.

RESEARCH METHOD

Sample and Data Collection

A total 500 people were contacted to fill this survey form from various sectors such as IT, FMCG and automobile. The selection of the respondents were made on two basis; first, the respondents must be

working in private/public or entrepreneurial firms and second, they must be practicing spirituality in any form. To check the reliability of the variables, initially response was filled from 30 respondents. The initial reliability of the overall scale was 0.78. Spirituality quotient of employees was measured using Spirituality Intelligence Scale presented by Upadhyay & Upadhyay (2016) where C1 = highly spiritual and C5 = Least spiritual. A few statements were revised on the suggestion of the respondents and finally the questionnaire was circulated among 500 people as stated above. To get the maximum responses, the people associated with various spiritual bodies such as 'The Art of Living Ashram', 'Osho Meditation', and 'Sri Aurbindo Ashram' etc. were contacted. The questionnaires were shared through emails with these respondents. The people were contacted during the Corona Lockdown period in India i.e. from May, 2020 to December 2020, to have easy availability of the respondents. Total 417 filled question-naires were received back out of which 25 questionnaire responses were discarded due to inappropriate responses or incomplete information. Finally, 392 responses were considered for further analysis and hypotheses testing. The sample characteristics are presented in Table I. After the analysis of sample, the responses of the employees were also analyzed separately. The data were analysed using statistical software SPSS 22.0.This data used to measure the relationship between the employee spiritual wellbeing, self-determination, and employee outlook and spirituality quotient in the workplace.

Table 1.Demographic characteristics of the respondents

Classification	Variable	N	%
Age (in Years	Up to 30 yrs	182	46.4
	31-45 yrs	144	36.7
	Above 45 yrs	66	16.8
Sex	Male	298	76.0
	female	94	24.0
Qualification	General	143	36.5
	Tech./Professional	249	63.5
Status	Married	260	66.3
	Unmarried	132	33.7
Cadre	top	35	8.9
	Middle	111	28.3
	operative	246	62.8
Total Experience	below 5 yrs.	153	39.0
	5-10	91	23.2
	10-15	50	12.8
	above 15 yrs.	98	25.0
Spirituality Quotient	C1	58	14.7
	C2	129	32.9
	C3	157	40.0
	C4	46	11.7
	C5	2	0.005
Total		392	100

In table I, majority of respondents (46.4 percent) were young people in the age group of below 30 years. 36.7 percent were middle aged of group 30-45 years. Majority of respondents were males (76 percent) and included rest 24 percent females. 36.5 percent of the respondents were general graduates, and 63.5 percent were technical/professional graduates.66.3 percent of employees were married and 33.7 percent were unmarried. On cadre basis 8.9 percent were from top management, 28.3 percent were from middle level, and rest all 62.8 percent were from operative level.39 percent of employees had below 5 years of experience, 23.2 percent were having an experience of 5-10 years, 12.8 percent had 10-15 years of work experience, and rest all (25 percent) were having experience more than 15 years as presented in Table I. Measuring spirituality intelligence, it was noticed that 14.7 percent of respondents were towards the realm of self-actualisation, 32.9 percent people scored high on spirituality intelligence, 40 percent respondents scored average on the scale whereas 11.7 percent respondents were found low on spirituality quotient i.e. less inclination towards spirituality (Table I).

Measures

The survey questionnaire consisted of variables designed to collect the aspects of the three concepts being researched in this paper i.e. Spiritual wellbeing, Outlook and self-determination. The five point Likert type scale format, 5 = strongly Agree, 1 = strongly disagree, unless otherwise signified) was used to measure all variables in this questionnaire. Self-determination scale proposed by American Institute for research was used to measure self-determination of employees (Garrels & Granlund, 2018). A Cronbach alpha value of .885 presented high reliability of the scale. The employee outlook was measured using Civic virtue statements of Organ's (1998) OCB (Organisation Citizenship behaviour) questionnaire (Lo & Ramayah, 2009). The Cronbach Alpha value of .804 was calculated for the factor. Spiritual wellbeing was measure using SWBQ (Spiritual well-being questionnaire) developed in 2003 by John W. Fisher (Abhari et al., 2018). The calculated Cronbach alpha value for the factor was .911.

The correlation matrix depicts the significant and positive correlation of self-determination with outlook and spiritual wellbeing of coefficient 0.43 and 0.67 units respectively. The correlation of outlook with self-determination and spiritual wellbeing also points towards significant positive relationship with the values indicating 0.435 and 0.387 units. Similarly, the correlation matrix for spiritual wellbeing presents substantial correlation between the variables self-determination and outlook with the values 0.67 and 0.38 units.

FINDINGS AND INTERPRETATION

Hayes model 59 was utilized for the speculation testing since it is used to check the moderation mediation impact. Self Determination, Outlook and spiritual wellbeing were the extracted factors to be undertaken into account for further analysis as moderator mediation. Where Y i.e. Self-determination was dependent variable, X Spiritual Wellbeing was independent variable, M was mediator i.e. Outlook and W Spirituality Quotient level was the moderator under study.

Table 2 presents the total model summary of self-determination is significant where the value of R is 0.7093 and R^2 is 0.5031. Table 3 inspects that mediator outlook has positive significant effect 0.23 unit on the dependent variable self-determination. In simple words, this means that with the positive 0.23 unit increase in the outlook will increase the self-determination by 1 unit. Subsequently, in Table 3, the

independent variable i.e. spiritual wellbeing also delineates positive significant effect on the dependent variable of 0.58 units, which indicates the positive change in the overall health by 0.58 unit affecting outcome variable by 1 unit change.

In Table 3, Interpreting the impact of the intercept 2 on self-determination is -0.05.The model summary represents the insignificant negative effect on the self-determination. The effect of the moderator spirituality quotient level on the self-determination was also tested. The spiritual quotient level showed significant positive impact of 0.16 units in Table III. Hence could be described that with the 0.16-unitchange in the moderator the self-determination will also change by 1 unit. In table III, correspondingly the intercept 3, insignificantly and positively affects the self-determination factor by 0.058 units. The Hayes model depicts the significant moderation of all the intercepts in Table 3. To be more specific, the moderator W, i.e., spiritual quotient level, moderates all routes in this model, providing a moderated indirect impact and a moderated direct impact.

Table 2. Model summary

R	R-Sq	MSE	F	Df1	Df2	p
.7093	.5031	.5034	78.1561	5.0000	386.0000	.0000

Table 3. Model coefficient

Variable	Coeff	se	t	p	LLCI	ULCI
Constant	-.0114	.0377	-.3025	.7624	-.0856	.0628
Employee Outlook	.2309	.0438	5.2663	.0000	.1447	.3170
Spiritual Wellbeing	.5838	.0404	14.4398	.0000	.5043	.6633
Int_2	-.0550	.0569	-.9666	.3343	-.1668	.0568
Spirituality Level	.1642	.0552	2.9777	.0031	.0558	.2727
Int_3	.0058	.0512	.1131	.9100	-.0949	.1065
Product Term key = Int_2: Employee Outlook x Spirituality Quotient Int_3: Spiritual wellbeing x spirituality quotient Outcome: Self Determination						

Direct Impact

In Table 4, the direct impact explains the spiritual wellbeing is affecting the self-determination with the moderation of spirituality quotient level. In the model, the effect of spiritual wellbeing on self-determination is identified when no mediator is present. Table IV result examines that the spiritual wellbeing is positively significant by 0.58 units on the self-determination. The effect of spiritual wellbeing on the independent variable will be in a way that 0.58 change in the spiritual wellbeing will also bring change in self-determination by 1 unit each (Table 4).

Table 4. Conditional direct effect of x (employee outlook) on y (self-determination) at the values of moderator (spirituality quotient)

Level	Effect	SE	t	p	LLCI	ULCI
-.6892	.5798	.0473	12.2692	.0000	.4869	.6728
.0000	.5838	.0404	14.4398	.0000	.5043	.6633
.6892	.5878	.0594	9.8959	.0000	.4710	.7046

Indirect Impact on Self-Determination

In Table 5, the indirect impact explains the spiritual wellbeing affecting the self-determination in mediation of outlook and moderation of spirituality quotient level. In Table 5, the model speaks the indirect impact of the mediator and the moderator on all the intercepting paths of 'X' spiritual wellbeing on 'Y' self-determination. The result was such that the effect of mediation outlook on X and Y was positively significant by 0.09 units (Table 5).

The table V depicts the significant moderation of all the intercepts. To be precise all paths in this model are moderated by the moderator W i.e. spiritual quotient level, yielding moderated a moderated indirect effect and a moderated direct effect. This presents that all the hypotheses have been accepted.

Table 5. Conditional indirect effect of x (spiritual wellbeing) on y (self-determination) at the values of moderator (spirituality quotient)

Mediator	Level	Effect	Boot SE	Boot LLCI	Boot ULCI
Outlook	-.6892	.0990	.0361	.0294	.1592
Outlook	.0000	.0904	.0289	.0452	.1549
Outlook	.6892	.0800	.0404	.0166	.1733
Values for quantitative moderators are the mean and plus/minus one SD from mean. Values for dichotomous moderators are the two values of the moderator.					

DISCUSSION AND CONCLUSION

With the Industrial revolution and Industry 4.0, many organisations have started focusing on lean methods to innovate their processes and functions. This lean interaction between men and machinery creates a whole new world of opportunities for people and organisations, known as Industry 5.0. As opposed to I4.0, Industry 5.0 focuses more on human requirements, enabling individuals to realise their fundamental beliefs and to express themselves through machine collaboration. The focus of Industry 5.0 is not only limited to automation, digitalisation and technological advancement replacing people. In I5.0, values and fundamental rights are the binding principles along with autonomy, privacy, dignity and employee's rights. Very rightly stated by European Commission (2021) that human and societal aspects need to be the core of any development. It is important to bring interventions that can strengthen the relationship between men and machine to develop a collaborative outlook instead of competitive one. Due to Indus-

try 4.0, many people lost their jobs, employees felt uncomfortable, spending more time on learning the functions of new machineries which not only affected their productivity; it created many other issues. Overloads have led employees to ignore their health and begin to suffer from stress, etc.

To transform organisations and people and to turn the concept of Industry 5.0 a reality, workplace spirituality can do wonders. Workplace spirituality is defined as bringing workers' souls and inspiration to work, as well as experiencing a sense of perfection and communal in their job, with the potential to transform the workplace into something special. It has been witnessing that spirituality in workplace promotes the organisational performance by creating positive outlook of employees towards organisational growth, improving the health and wellbeing of people and ultimately raise the self-determination among employees to accept change with positive mind-set. Spiritual training might help boost the employees' wellbeing both in physical and psychological terms, improves self determination to adapt and accept new technologies and innovation and change their outlook and perspective towards the organisational approach of transforming workplace with advancements (Willis, 2018).

The study analysis clearly presented a significant and positive correlation between employee's spiritual wellbeing and self-determination. The results indicate that when employees' feel healthy, both, physically and spiritually, it improves the self-determination among them. Self-determination is required to have faith on oneself, its own capabilities not to accept the destiny but to design it and transform it. The results further revealed that employee outlook and perspective towards change and organisation significantly mediate the relationship between spiritual wellbeing and self-determination. Many researchers have presented the positive impact of spirituality on developing positive outlook among people (Giacalone & Jurkiewicz, 2010; Krishnan, 2008; Lappay, 2020). Employees with positive outlook and perception don't question the technological advancements and understand the importance of industrial revolution and automation. They better equip themselves to be part of the change. The study further presented that the spirituality quotient/intelligence of an employee significantly moderates the relationship between the three factors present in study i.e. spiritual wellbeing, employee outlook and self-determination. The organisations must focus on the spiritual development of employees along with technological advancement which is the core of Industry 5.0.

LIMITATIONS OF THE STUDY

Approaching to the respondents was the most difficult task due to the lockdown and mandatory work from home policy. Due to privacy constraints, we could not collect information about user's personal habits. Consequently, some employees were not ready to share their personal information. In this research, we identified only three variables, but there are many others variables related to employee wellbeing. So, selecting only three variables is a limitation.

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Chapter 9
A Model for Evaluating HR Analytics Critical Success Factors in Industry 5.0

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ABSTRACT

This study offers a methodology to evaluate HR analytics application critical factors that can aid HR managers in making proper strategic decisions. To help advance the study on the implementation of HR analytics, this research is based on the grey DEMATEL approach to envisage the formation of complex interrelation between the CSFs and find the effect level of these factors. Drawing conclusion from the above, the present study addresses certain key issues. Firstly, it aims to examine the challenges in implementing HR analytics techniques in Indian industry. Secondly it examines the causal relationship to analyses the tasks and their effect in detail. After analysing the available literature and creating the research problem based on the gaps observed, the chapter accentuates the necessity for studying and analysing the HR analytics challenges in Indian industries.

INTRODUCTION

In a corporate world that is evolving at unprecedented rates, many businesses are reacting by implementing methods that emphasise critical review, real-time data analysis, and the cultivation of agile decision-making. VUCA (volatility, uncertainty, complexity, and ambiguity) is a military acronym that

refers to severe circumstances; in business, it refers to the notion that technology advancements and a global economy have generated new problems, necessitating the abolition of status quo thinking. VUCA forces organisations to rethink how they use technology for the benefit of all stakeholders; it necessitates adaptability in job design and organisational structure, systems thinking combined with agility, and a focus on what customers truly want in order to remain loyal to the organisation despite competition. Within this shifting corporate landscape, businesses are discovering that the methods they previously used to manage their operations are insufficient in today's VUCA climate. Technological HR has been viewed as a'must have' capacity for the success of human resource functions, a method for extracting value from people, and a means of expanding the HR function's strategic impact (CIPD, 2013). With the transformation of economies to circular economy aiming to base itself on sustainability and reuse of existing resources it has generated a path towards IIOT, technology and also for human- machine interaction for effective working (Chang & Wang, 2010).

Though a god amount of research has been done in the vicinity of HR Analytics, yet there is a substantial gap in examining the challenges in implementation of HR analytics, especially in context to India and also reflecting on their cause and outcome relation for successful future implementation. There has been a lot of groundwork undertaken by Indian economy in form of various plans supporting the implementation of HR Analytics which reflects the future of business, yet there is a substantial gap when we examine the implantation and result of HR Analytics techniques in Indian industries, as rightly lessons have established that prior changes, planning is crucial to ensure any changes, aiming to decrease the failure rate (Wortmann and Fluchter, 2015). The research promises a lot of significance as countries like India has tremendous capacity for the expansion of its analytics industry. According to the India Brand Equity Foundation, technology in India's hyperconnected country has the potential to achieve an estimated 2 billion connections, unleashing $11.1 billion in income by 2022.

Drawing conclusion from the above the present study addresses certain key issues. Firstly, it aims to examine the challenges in implementing HR analytics techniques in Indian industry. Secondly it explores the cause-and-effect relationship to analyses the challenges and their impact in detail. After understanding the available literature and formulating the research problem based on the gaps observed, the paper emphasizes the need for studying and analysing the HR analytics obstacles in Indian industries. The chapter is divided in various parts; the introduction part, followed by literature disclosing the challenges of adopting HR analytics techniques in Indian industry. Further, it brings forward the methodology of the research. A decision-making test and evaluation laboratory (DEMATEL) methodology is taken to determine relations between the key challenges, followed with the results and discussions. The implementation on HR analytics is hence all pervasive in organisation as depicted in figure below-

REVIEW OF LITERATURE

The area of analytics is not new rather this field of measuring human resource can be traced since 1900 (Kaufman, 2014). However, in past years this area has gained a tremendous amount of importance from, research and implementation point of view. The definition of analytics has moved from technology to much more refined scenario where it aims at understanding the behaviour and generating desired outcomes by using technology (George et al., 2018). This data when able to generate smart and strategic insights is said to reap the advantages of analytics (Smeyers, 2016). Thus, analytics involve both the traditional and enhanced outlook where the data is not only scrutinised and recorded but effectively interpreted to

Figure 1. HR Analytics in organisations
(Source- Author's own)
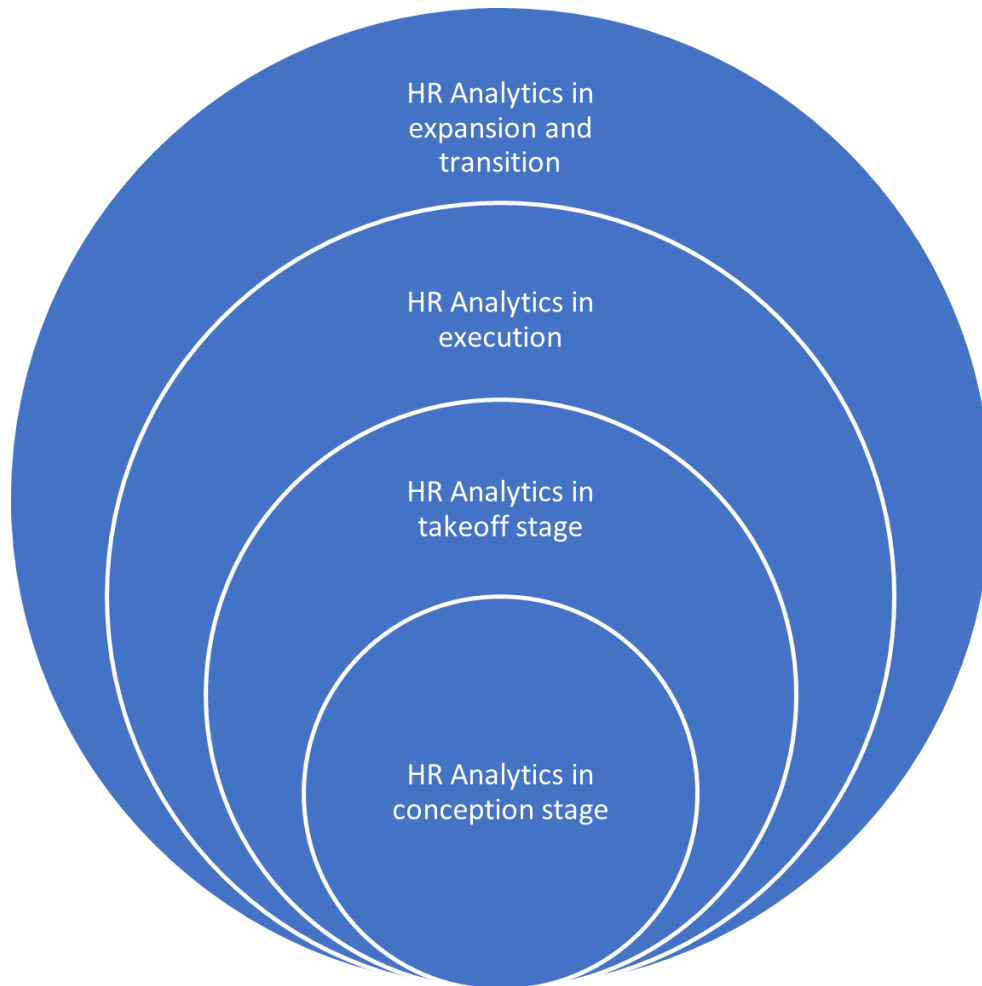
generate desired results helpful for HR in varied functions like managing, forecasting, budgeting and others. Varied software's have helped the analytics to obtain and target the respective outcome (Parry, 2011) and have rendered the world a small place. After getting an integrative synthesis of the available work in this area its observed that despite of so much of effort in this field the gap exists when it occurs to its effective implementation to reap benefits (Barends et al., 2014). The HR analytics which is also referred to tech human resource aims at incorporating technologies into the HR arena in varied functions coordinating the organisation (Hartmann and Haelcker, 2015) and its adoption have drastically filled the gaps in contemporary challenges of the global economy. Overall it act as a catalyst making companies efficient to beat future challenges and scenarios (Marler et al., 2017). The future of the sustainable and successful organization lies drastically on the successful adoption and implementation of analytics in organizations. Effective organisations are the ones which are capable to move forward with changes and adaption to new technology (Basi, 2011). With changing dynamism the analytics framework has gained momentum in organisations and seeks for attention for successful adoption (Rasmussen and Ulrich, 2015).

The implementation of analytics need to strongly embedded for deriving complete benefits (Boudreau & Jesuthasam, 2011). There has been a substantial amount of research in this arena with respect to its benefits and opportunities for the organisations, yet its effective implementation has been an area which is relatively less explored (Kagermann et al., 2013). The practical implementation of analytics has been relatively low (Levenson, 2005), seeing the economic perspective, the HR analytics facilities enhances the connectivity, reduce costs and creates better quality of products and deliverables (Oesterreich and Teuteberg, 2016). However, like any other technological implementation, even successful implementation of analytics requires certain preconditions generation like foremost need of very huge capital and even an economy, which supports such heavy capital investment (Laudien and Daxbock, 2016). The importance of a sound logistics framework and infrastructural backing makes the implementation more stronger (Zhou et al., 2017) and for every part of this the organisations need to be really proactive and prepared (Remane et al., 2017) which is the grey area or the research gap, taken in the current study.

Though a lot of earlier studies have emphasized on importance, challenges, discussions on advantages, yet the literature lacks in developing comprehensive economic analysis on the challenges in successful implementation of these techniques in different companies (Bret et al., 2014).

The paper consequently examines the research question, what are the key difficulties or setbacks in winning implementation of HR analytics? What is the causal relationship of various challenges? The authors aim at analysing the pre challenges of HR analytics, disclosing their perception with reference to specific industry. Scant research has led us to adopt grey DEMETAL design and explain the most dominating challenges through this approach.

RESEARCH METHODOLOGY

The DEMATEL technique's efficacy stems from its unique ability to eliminate any ambiguity in the data and to reveal the cause-effect connection between the components. In real-world applications, ambiguity is exacerbated by inappropriate human judgments and imprecise information. Unquantifiable, fragmentary, difficult-to-obtain knowledge, and partial ignorance are all examples of these incorrect sources. Given that these constraints cannot be addressed successfully using classical or crisp DEMATEL, a DEMATEL technique based on grey systems theory would be an acceptable and effective approach. It is a framework for efficiently analysing systems with imperfect information and enables the proper management of uncertainty.

Grey system theory is capable of producing successful outcomes with a small data set, even in the face of uncertainty, and it also enables the examination and modelling of systems with limited or incomplete information. Before we discuss the grey-based DEMATEL method, we will discuss some key grey system concepts and operations.

Steps involved:

To define the assessment criteria and the grey linguistic scale, go to step 1: To account for the uncertainty inherent in human evaluations, we establish and recognise evaluation criteria and a grey linguistic scale. The language scale and associated grey numbers have been assigned values based on the analysis results.

Step 2: Creating the matrix of direct relationships: To determine the link between the criteria denoted by C=Ci|i=1,2,..,n, a group of professionals is tasked with doing pairwise comparisons. We acquire the first direct connection grey matrix A.

$$A^k = \begin{array}{c} C_1 \\ C_2 \\ \vdots \\ C_n \end{array} \begin{bmatrix} 0 & \otimes a_{12}^k & \cdots & \otimes a_{1n}^k \\ \otimes a_{21}^k & 0 & \cdots & \otimes a_{2n}^k \\ \vdots & \vdots & \vdots & \cdots & \vdots \\ \otimes a_{n1}^k & \otimes a_{n2}^k & \cdots & 0 \end{bmatrix} \tag{1}$$

where k is the number of experts, $\otimes a_{ij}^k = [\underline{a}_{ij}, \overline{a}_{ij}]$ are grey numbers and for $\otimes a_{ii}^k = [0,0]$ for *i=1,2,...,n*.

Step 3: Consolidation of all grey direct relationship matrices: By averaging all of the grey direct relation matrices using Eq (6), the aggregate matrix Z is produced.

$$Z = \left(\sum_{i=1}^{k} A^k\right) / k \tag{6}$$

Step 4: Developing and analysing the structural model: The linear scale transformation is converted to a normalising formula in order to convert the criterion scales to similar scales. Let

$$\sum_{j=1}^{n} \otimes z_{ij} = \left[\sum_{j=1}^{n} \underline{z}_{ij}, \sum_{j=1}^{n} \overline{z}_{ij}\right] \tag{7}$$

And $r = \max_{1<i<n} \left(\sum_{j=1}^{n} \overline{z}_{ij}\right)$

Then, the normalized direct-relation grey matrix, G, is equal to $G = r^{-1} \times Z$
And

$$G = \begin{bmatrix} 0 & \otimes g_{12} & \cdots & \otimes g_{1n} \\ \otimes g_{21} & 0 & \cdots & \otimes g_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \otimes g_{n1} & \otimes g_{n2} & \cdots & 0 \end{bmatrix}$$

Where $\otimes g_{ij} = \dfrac{\otimes z_{ij}}{r} = \left[\dfrac{\underline{z}_{ij}}{r}, \dfrac{\overline{z}_{ij}}{r}\right] \tag{8}$

Step 5: To establish the total relation matrix: After obtaining Matrix G, the grey normalised direct relation matrix, the grey total T relation matrix may be discovered using the resulting equations.:

$$T = G + G^2 + ... + G^k$$
$$T = G\left(I - G\right)^{-1}, when\ \lim_{k \to \infty} G^k = [0]_{n \times n}$$

(9)

$$T = \begin{bmatrix} \otimes t_{11} & \otimes t_{12} & \cdots & \otimes t_{1n} \\ \otimes t_{21} & \otimes t_{21} & \cdots & \otimes t_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \otimes t_{m1} & \otimes t_{m2} & \cdots & \otimes t_{mn} \end{bmatrix}$$

And $\otimes t_{ij} = \left[\underline{t_{ij}}, \overline{t_{ij}}\right]$

(10)

and

$$Matrix\left[\otimes \underline{t_{ij}}\right] = \underline{G} \times \left(I - \underline{G}\right)^{-1}$$

$$Matrix\left[\otimes \overline{t_{ij}}\right] = \overline{G} \times \left(I - \overline{G}\right)^{-1}$$

Step 6: Prior to calculating the sum of rows and columns, the grey total matrix T is whitened. The grey values are converted to crisp values using the modified CFCS [19] described below.

$$\otimes \underline{t_{ij}} = \left(\otimes \underline{t_{ij}} - \min \otimes \underline{t_{ij}}\right) / \Delta_{\min}^{\max}$$

(11)

$$\otimes \overline{t_{ij}} = \left(\otimes \overline{t_{ij}} - \min \otimes \overline{t_{ij}}\right) / \Delta_{\min}^{\max}$$

(12)

Where $\Delta_{\min}^{\max} = \max \otimes \overline{t_{ij}} - \min \otimes \underline{t_{ij}}$

$$Y_{ij} = \frac{\otimes \underline{t_{ij}}\left(1 - \otimes \underline{t_{ij}}\right) + \otimes \overline{t_{ij}} \times \otimes \overline{t_{ij}}}{1 - \otimes \underline{t_{ij}} + \otimes \overline{t_{ij}}}$$

(13)

141

$$z_{ij} = \min \otimes \underline{t_{ij}} + Y_{ij} \Delta_{\min}^{\max} \tag{14}$$

where z_{ij} are the crisp values. Then the sum of rows and columns are distinctly denoted as d and r within the total relation matrix T as in Eq. (15).

$$T = \left[t_{ij}\right], \qquad i, j \in \left\{1, 2, ..., n\right\}$$

$$d = \left(d_i\right)_{n \times 1} = \left[\sum\nolimits_{j=1}^{n} t_{ij}\right]_{n \times 1}$$

and

$$r = \left(r_j\right)_{1 \times n} = \left[\sum\nolimits_{j=1}^{n} t_{ij}\right]_{1 \times n} \tag{15}$$

Step 7: To analyse the outcome, d+r total represents the impacts of all criteria, while d-r represents the causal relationships between all criteria. In other words, d+r demonstrates the criterion's significance. If d-r is positive, it indicates that the criterion or factor has a causative impact on others; if d-r is negative, it indicates that the criterion or factor is influenced by others.

RESEARCH DESIGN

The research design is adopted to recognise the queries that are being faced by enterprises in India in implementing HR Analytics in their business operations. An extensive literature study and discussion with different patrons was carried out to find the list of challenges. Seven patrons were chosen for the understanding of the data. The team of stakeholder comprises of 3 academicians and 6 industry professions working in the field of HR Analytics. This assorted team of stakeholders were selected to incorporate various perspectives into the decision-making process. Based on the unanimity of these stakeholder, the following critical challenges were shortlisted as given in Table1

The current study is planned to recognize the hurdles that are encountered by enterprises in India in executing HR Analytics in their business processes using Grey DEMATEL methodology. To conduct the study challenges were shortlisted which will lead in the achievement of the objectives.

APPLICATION OF GREY DEMATEL APPROACH

The method is used to analyse the issues for HR analytics adoption. The methodology is used as per the steps illustrated above. After finalizing the list of the hurdles met by the organisations built on prior research and deliberations with stakeholders, the data was analysed. Following the steps of research methodology, the evaluation of the challenges was done, and linguistic scale was assigned to the critical factors. Table 2 represent the evaluation of challenges by the stakeholders.

Table 1. List of shortlisted challenges

Notation	Challenges	Description	References
CR1	**Lack of strategic alignment**	Many analytics applications though incorporated lack in obtaining the right fit due to misfit with strategic framework	Bandara et al, 2005
CR2	**Lack in real time Performance**	The time lag between implementation and action in the case of hr analytics implementation	Sisinni et al, 2018
CR3	**Lack in project management**	The area of effective project management involves lot of planning, coordination, and synchronisation of analytics with data of the organisation. Lot of organisation lack in this area leading to mismatch with effective outcomes.	Rosemann and Vom Broke (2010)
CR4	**Security Challenge**	The fear of security is pervasive in case of any IT enabled software for human resource in any organisation.	Zetter,2011
CR5	**Privacy Challenge**	Throughout the lifecycle of systems and products, it is necessary to address factors such as platform security, secure engineering, security management, identity management, and industrial rights management.	Sadeghi et al, 2015
CR6	**Collaborative Challenge**	HR Analytics lacks in developing coordination amongst the varied departments in organisations, to use the data	Trkman (2010)
CR7	**HR Data Management Challenge**	The systematic storage of data has been a major challenge in the arena of data analytics.	Khan, A., & Turowski, K., 2016
CR8	**HR Data Mining Challenge**	The usage of right data and right processing of data is one of the critical factors effecting effective implementation of hr analytics.	Senthil, A., & Easwaran, I., 2019
CR9	**Gap in cultural fit**	Effective connectivity and synchronization with the team working on HR analytics is a must for obtaining desired potential results.	Ngai et al . (2008)
CR10	**Lack of customer focus**	The planning and implementation lacks in developing futuristic approach in proper implementation of HR analytics to avoid further cost and make it more sustainable. As every tech gadget has a user its important to ensure a good coordination between the customer and user interface.	Ravesteyn and Batenburg (2020)
CR11	**Lack of top management proactivity**	Integration between top management and ground level is a must. Also, to match the glocal economy changes the top management needs to be proactive.	Zabjek et al. (2009)
CR12	**Technical Glitch**	The technical errors create frequent troubles. This technical interruption leads to challenging scenario in hr analytics framework	Kumar (2019)

In the similar way, the information was taken from the rest of the major decision makers for the research study regarding the linguistic term where CR refers to critical factor 1, 2, 3 till critical factor 12 as extracted from the literature and validated through expert opinion. The values denote as reflected in table 2.1 below-

Table 3 indicates that when all N Matrix are collected and averaged. We generate the average aggregate matrix Z. To convert criterion scales to a similar scale, step 4 converts the linear scale to a normalised formula. The normalised direct relation matrix N is presented in Table 4.

After seeing the Grey Matrix for Stabilized Direct Relationships, we can now use step 5 to obtain the Grey Matrix T.

Table 2. Linguistic term matrix for first decision maker.

	CR1	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10	CR11	CR12
CR1	No	No	VL	H	L	VL	VL	H	No	VL	L	L
CR2	VL	No	VH	L	VH	L	VH	L	H	VH	L	L
CR3	H	VL	No	L	VH	VL	L	H	VH	VL	L	L
CR4	VH	H	L	No	VL	VH	L	L	H	H	L	VL
CR5	H	VH	L	L	No	L	VL	L	VH	L	VH	H
CR6	L	H	L	VH	L	No	VH	H	L	VH	L	VH
CR7	L	VH	VH	VL	VL	VH	No	L	L	H	H	L
CR8	VH	L	L	L	H	H	L	No	VH	L	VH	L
CR9	VL	VH	H	H	VL	VL	L	VH	No	VH	L	L
CR10	L	VH	VH	H	L	L	VL	H	L	No	L	L
CR11	VH	L	VH	VH	L	L	L	L	VL	VH	NO	VL
CR12	L	VH	L	L	VH	L	VL	L	VL	VH	NO	L

Table 3.

Linguistics term	Grey number
No influence (N)	[0, 0]
Very low influence (VL)	[0, 1]
Low influence (L)	[1, 2]
High influence (H)	[2, 3]
Very high influence (VH)	[3, 4]

After obtaining the grey matrix T, it is whitened in order to acquire the crisp values through the CFCS - Converting Fuzzy Data to Crisp Scores technique. Step 6 of the technique is used to finish the whitening of Matrix T. After converting the values to crisp values, the cause and effect connection between the components is determined using the formulas (D + R) and (D – R) in Table 7 below. D-R values greater than zero indicate that the factor is a cause, whereas values less than zero indicate that the factor is an effect.

RESULT AND ANALYSIS

The relationship is established by taking out the limit value and doing the comparison of values which are >than the threshold value in each factor listed. We can state that CR1,CR2,CR5,C6, CR9,C11 and C12 are cause challenges while CR4, CR3, CR7, CR8 are effects. C1- Lack of strategic alignment, C4 - Security Challenge, C6 - Collaborative Challenge, C11- Lack of top management proactivity, C12- Technical glitch. C2 – Lack in Real Time Performance, C3- Lack in project management, C5 - Privacy Challenge, C7 – Data Management Challenge, C8 – Data Mining Challenge and C9- Gap in cultural fit. Thus with the emerging times the organisations need to pay specific attention to the causal and effective factors for reaping full benefits of HR analytics implementation towards making a better workplace

144

Table 4. Average aggregate matrix Z

	CR1	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10	CR11	CR12
CR1	[0, 0]	[2, 1]	[2, 3]	[2, 2]	[2, 3]	[2, 1]	[1, 3]	[1, 3]	[0, 1]	[1, 3]	[1, 2]	[1.874, 2.775]
CR2	[1, 3]	[0, 0]	[1, 3]	[1.864, 2.735]	[1, 3]	[2.15, 3.35]	[1, 3]	[2.653, 3.675]	[1, 1]	[2, 2]	[1, 0]	[0, 1]
CR3	[1, 3]	[1, 1]	[0, 0]	[1, 3]	[3, 2]	[2, 2]	[3, 2]	[0, 3]	[1, 1]	[0.115, 1.115]	[2, 3]	[2.755, 3.674]
CR4	[1, 3]	[1, 1]	[1, 3]	[0, 0]	[1, 3]	[1, 1]	[3, 2]	[1, 3]	[0.845, 1.825]	[1, 3]	[0, 2]	[1, 3]
CR5	[2, 1]	[0.815, 1.675]	[1, 1]	[1, 3]	[0, 0]	[3, 1]	[0.12, 1.113]	[2, 4]	[0.755, 1.575]	[0, 0]	[3, 2]	[3, 1]
CR6	[2, 1]	[3, 2]	[3, 2]	[2, 1]	[1, 3]	[0, 0]	[1, 1]	[1, 3]	[0.12, 1.132]	[0, 0.845]	[0, 0]	[0, 1]
CR7	[0, 0.35]	[1, 3]	[2, 2]	[1, 3]	[1, 3]	[2, 0]	[0, 0]	[1, 3]	[1, 3]	[1, 0]	[0, 0.15]	[2, 2]
CR8	[1, 3]	[1, 1]	[1, 3]	[0, 0]	[1, 3]	[0, 1]	[0, 0]	[0, 0]	[0, 1]	[0, 1]	[1, 0]	[0, 1]
CR9	[1, 0]	[0, 2]	[1, 3]	[3, 2]	[0.815, 1.75]	[2, 2]	[0, 1]	[1, 3]	[0, 0]	[0, 0.111]	[1, 3]	[1, 3]
CR10	[1, 4]	[2, 4]	[1, 3]	[2.005, 3.105]	[2, 2]	[2, 2]	[0, 2]	[0, 0]	[1, 3]	[0, 0]	[0, 0]	[1, 0]
CR11	[1, 1]	[1, 0]	[1, 3]	[3, 2]	[2, 2]	[1, 0]	[0, 1]	[3, 1]	[3, 2]	[0, 0]	[0, 0]	[1, 3]
CR12	[1, 3]	[0, 0]	[1, 3]	[1.864, 2.735]	[1, 3]	[2.15, 3.35]	[1, 3]	[2.653, 3.675]	[1, 1]	[2, 2]	[1, 0]	[0, 0]

CONCLUSION

The study gives a deep insight into the HR analytics challenges and their respective importance by using the DEMATEL technique determining the causal connect. The research focused on scrutinizing the challenges with the aid of various stakeholders. The major benefit behind the study is to make the organisation prepare for future by beating the varied significant challenges in implementing HR analytics in organisation which is the need and priority on today's organisation for successful working.

The study adopts methodology based on Grey to avoid the uncertainty and ambiguity of information. The aim of the paper was to identify the challenges and relationship between the factors. To study the relationship grey linguistic terms were used to avoid uncertainty of data. It can also be concluded that cause from any factor very much affects the other factor. Further studies may include assessment of the research by using other methodologies.

Table 5. Grey matrix N showing the normalised direct relation

	CR1	CR2	CR3	CR4	CR5	CR6	CR7	CR8	CR9	CR10	CR11	CR12
CR1	[0.000, 0.000]	[0.116, 0.004]	[0.116, 0.004]	[0.043, 0.059]	[0.016, 0.004]	[0.116, 0.004]	[0.116, 0.004]	[0.116, 0.004]	[0.001, 0.025]	[0.006, 0.114]	[0.113, 0.089]	[0.007, 0.000]
CR2	[0.116, 0.034]	[0.000, 0.000]	[0.043, 0.059]	[0.089, 0.110]	[0.116, 0.004]	[0.216, 0.140]	[0.003, 0.118]	[0.142, 0.124]	[0.043, 0.059]	[0.043, 0.079]	[0.112, 0.232]	[0.000, 0.025]
CR3	[0.000, 0.000]	[0.022, 0.035]	[0.000, 0.000]	[0.126, 0.124]	[0.043, 0.059]	[0.043, 0.059]	[0.033, 0.059]	[0.116, 0.124]	[0.123, 0.118]	[0.047, 0.049]	[0.116, 0.114]	[0.142, 0.124]
CR4	[0.043, 0.059]	[0.023, 0.034]	[0.116, 0.224]	[0.000, 0.000]	[0.116, 0.104]	[0.143, 0.035]	[0.033, 0.029]	[0.157, 0.105]	[0.022, 0.035]	[0.043, 0.065]	[0.083, 0.069]	[0.116, 0.104]
CR5	[0.000, 0.025]	[0.036, 0.061]	[0.000, 0.025]	[0.136, 0.104]	[0.000, 0.000]	[0.123, 0.035]	[0.127, 0.029]	[0.154, 0.135]	[0.056, 0.065]	[0.000, 0.000]	[0.073, 0.079]	[0.111, 0.035]
CR6	[0.000, 0.025]	[0.023, 0.065]	[0.033, 0.059]	[0.234, 0.035]	[0.116, 0.104]	[0.000, 0.000]	[0.134, 0.035]	[0.136, 0.104]	[0.087, 0.073]	[0.111, 0.030]	[0.000, 0.000]	[0.237 0.000]
CR7	[0.000, 0.016]	[0.116, 0.104]	[0.043, 0.067]	[0.116, 0.104]	[0.136, 0.104]	[0.116, 0.104]	[0.000, 0.000]	[0.136, 0.104]	[0.053, 0.099]	[0.456, 0.450]	[0.06780, 0.049]	[0.987, 0.056]
CR8	[0.000, 0.000]	[0.023, 0.049]	[0.057, 0.029]	[0.043, 0.059]	[0.000, 0.025]	[0.000, 0.034]	[0.111, 0.000]	[0.000, 0.000]	[0.000, 0.025]	[0.056, 0.000]	[0.430, 0.000]	[0.000, 0.085]
CR9	[0.111, 0.000]	[0.033, 0.049]	[0.116, 0.114]	[0.033, 0.049]	[0.026, 0.065]	[0.043, 0.059]	[0.111, 0.135]	[0.156, 0.104]	[0.000, 0.000]	[0.000, 0.004]	[0.063, 0.069]	[0.156, 0.104]
CR10	[0.139, 0.129]	[0.149, 0.129]	[0.136, 0.114]	[0.103, 0.108]	[0.153, 0.039]	[0.129, 0.126]	[0.033, 0.089]	[0.123, 0.148]	[0.178, 0.104]	[0.000, 0.000]	[0.000, 0.000]	[0.000, 0.085]
CR11	[0.234, 0.015]	[0.000, 0.000]	[0.136, 0.154]	[0.043, 0.069]	[0.117, 0.039]	[0.111, 0.678]	[0.130, 0.036]	[0.189, 0.139]	[0.063, 0.069]	[0.000, 0.000]	[0.000, 0.000]	[0.106, 0.104]
CR12	[0.022, 0.015]	[0.000, 0.000]	[0.136, 0.124]	[0.026, 0.045]	[0.136, 0.104]	[0.234, 0.987]	[0.123, 0.035]	[0.116, 0.103]	[0.000, 0.085]	[0.063, 0.069]	[0.106, 0.104]	[0.000, 0.000]

Table 6. Values of D + R and D − R for factors

	D	R	d+r	d-r	Cause/Effect
CR1	19.718	15.347	35.065	4.371	Cause
CR2	18.032	14.934	32.966	3.098	Cause
CR3	12.130	16.649	28.799	-4.519	Effect
CR4	16.346	15.230	31.567	-15.23	Effect
CR5	16.234	15.303	31.537	0.931	Cause
CR6	19.135	17.409	36.544	1.726	Cause
CR7	15.622	16.530	32.125	-0.908	Effect
CR8	14.651	16.548	31.199	-1.897	Effect
CR9	16.719	17.439	34.158	-0.720	Effect
CR10	17.432	16.567	33.999	0.865	Cause
CR11	22.117	18.210	40.327	3.907	Cause
CR12	22.111	19.172	41.283	2.939	Cause

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KEY TERMS AND DEFINITIONS

Analytics: A method to do systematic analysis of data/information.

Human Resource: A team of people who make the workforce join hands for a common productive purpose.

Model: A scientific research method of modelling the concept.

Organisations: A structure or arrangement of connected items.

Stakeholders: A person with interest/stake in business.

Chapter 10

Managing Human Resources in Artificial Intelligence Era 5.0

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ABSTRACT

Artificial intelligence (AI) has grown by leaps and bounds in the past few years making it a necessary tool for organizations all over the world to pave the road to a smart future by entering into its various functions and making it more efficient. However, companies in India have been hesitant and slow to adapt this technology, and this hesitation is ever so clearly seen in the human resources function of the organization. The primary purpose of this chapter is to explore the application, benefits and challenges of integration, and the limitations of AI in HRM within the Indian context. The study is relevant and beneficial to organisations that seek to enhance the effectiveness and efficiency of their HRM functions by leveraging the power of AI.

INTRODUCTION

As a consequence of globalization and tremendous advancements in information technology, Human Resources (HR) has continuously progressed, allowing it to transcend numerous barriers that formerly confined it to being regarded a strictly administrative role inside the enterprise. (Mellam, Rao & Mellam, 2015). As a result of this expansion, continual changes in the concentration of HR functions may be observed. The first phase, which looked into the impact of HR processes on employees, became more structured. The HR department expanded its scope in phase two, evaluating entire HR systems rather than individual HR practices. The last phase witnessed a pattern change in HR as a result of the realization

that only HR could successfully connect the organization's goals with employee goals as it shifted from HR to Society of Human Resource Management (SHRM) (Wright & Ulrich 2017). However, because knowledge and data are the most critical elements for every plan, playing a strategic role is challenging. This has forced HR to go even farther in order to meet the need for information and adapt to the demands and changes of today's business environment, which is geared around maximizing profits at the lowest possible cost. In order to better their strategic role, HR has developed into a profession that is heavily influenced by technology and data gathered on a daily basis from employees. As a result, E-HRM has evolved, in which HR functions as a platform rather than a person. Technology has progressed from a simple machine meant to reduce human labour to more complex systems capable of much more. Because to a combination of technologies including information technology (IT), web-based apps, and logical models, businesses have been able to interact with their workers more efficiently (Oswal & Narayanappa, 2015). Artificial Intelligence is one of the most powerful technologies that has a common ancestor (AI). AI has been adopted by HR departments all around the world because of its limitless potential and applications. AI and HR are being combined by some of the world's top companies, like IBM, Amazon, and Google, to give innovative solutions to employee HR concerns (Aspan, 2020). According to a poll performed by HR.com, checking employee working hours and turnout, analytics and metrics, hiring and selection, training and development, and compensation are some of the tasks in HR where AI interventions have the most promise (HR.com, 2017). At the same time, there seems to be a reluctance to spend and adapt. AI has become more prevalent in HR operations in enterprises across the world than in other corporate activities such as marketing, finance, and so on (Brin, 2019). In India, AI in HR has not made the same development and integration as AI in other sectors of business. Many HR experts are skeptical of AI, fearing that it would fail to produce acceptable results in areas that need empathy and intuition (PWC, 2017). Despite the fact that many HR decisions are not exclusively based on data, many Indian HR departments still believe that interacting with workers efficiently requires personal connection. The focus on problems like the ethics of making decisions purely on the basis of AI and other technology appears to be fueling resistance (Desai, 2019). As a result, most Indian HR departments have turned a blind eye to the fact that, in this data-driven era, when data is the key to unlocking limitless possibilities, a large amount of data collected from employees is not being used efficiently.

Artificial Intelligence

Artificial intelligence (AI) is a technology that enables computers to learn from and suggest high-level actions based on previously collected data. Artificial intelligence may be used to simplify operations and improve efficiency in human resource management in a variety of ways.

It's incredible how rapidly the management conversation has progressed from big data to machine learning (ML) to artificial intelligence (AI). The majority of businesses are having trouble establishing data analytics capabilities: Only 4% of CEOs believe they are "significantly ready" to employ new data analysis techniques, while 41% say they are "not at all" ready (IBM 2018). During the last several years, significant progress has been made in the fields of pattern recognition and natural language processing. In some data-rich situations, deep learning with neural networks has grown more frequent, bringing us closer to genuine AI, which is the ability of machines to replicate adaptive human decision-making.

Challenges in Applying Artificial Intelligence to Human Resource Issues

The use of artificial intelligence to human resource concerns faces several challenges. They range from the practical to the abstract, such as the fact that the nature of data science research when applied to individuals conflicts with the criteria that cultures deem necessary for making critical judgements about people.

Consider the following considerations:

- One problem is that HR outcomes, such as what it means to be a "good employee," are complicated. That structure has a lot of dimensions, and it's impossible to measure them all exactly for most jobs: The most frequently used measure, performance assessment ratings, has been severely criticized for concerns of validity and dependability, as well as bias, and many companies are rejecting them completely (Cappelli and Tavis 2017). It's tough to distinguish individual performance from group performance since each fairly sophisticated task is related with other occupations. (Pfeffer and Sutton 2006).
- Human resource data sets are usually small by data science standards. When compared to the quantity of purchases made by its customers, even a large corporation's employee count is little. In addition, many fascinating outcomes, such as people getting fired for poor performance, are uncommon. Data science techniques fail when it comes to anticipating unexpected events.
- Because human resource choices (such as who gets employed and dismissed) have such a large impact on people and society, questions of fairness – both procedural and distributive justice are crucial. Employers' ability to make these judgments is hampered by complicated legal frameworks. Such frameworks emphasize causality, which is sometimes overlooked in algorithm-based research.
- A variety of complicated socio-psychological factors influence employees' work decisions which have an impact on both company and individual results. As a result, the capacity to explain and defend one's actions is far more vital in this profession than it is in others.
- Finally, employees can play games with algorithmic judgements or react badly to them. Their activities have an impact on the outcomes of the enterprise.

The AI Life Cycle

The conventional AI Life Cycle includes:

"Operations," which covers topics like how a firm recruits employees, is the topic of attention. One of the reasons for the interest in utilizing data science approaches in HR is that there are so many procedures and so much money involved. In the US economy as a whole, labour accounts for around 60% of all expenditures (MLR 2017). In the service business, this percentage is much higher. Each of these procedures involves administrative tasks, has a substantial influence on the organization's operation, and includes specific offices, job roles, written instructions and regulations to follow, as well as all parties' actual activities and interactions. As a result of these actions, texts, recordings, and other objects are produced. Many of these outputs are in the form of "digital exhaust," which is trail data on digital activities (e.g., online job applications, skills tests) that may be used to build recruiting algorithms when operations move to the virtual realm.

Human resource information systems, applicant tracking systems, digital exhaust, and other indications are required for the "data production" stage. Data must frequently be obtained from several databases, translated into a common format, and integrated before any analysis can be performed.

Machine learning (ML) is a wide term that refers to a set of techniques that can adapt and learn from data to build algorithms that better over time at a job, usually prediction. The most frequent use of machine learning in business has been "supervised" applications, in which a data scientist builds a machine learning algorithm, chooses the best relevant metric to test its performance, and then trains the algorithm using the training sample. Some of the most frequently used prediction algorithms, such as logistic regression and random forest, are used to infer the outcome variable of interest based on statistical correlations between observable variables. On a development sample, the accuracy of preliminary models is assessed until it reaches a satisfactory level. The final model is run on the test sample, and the accuracy of the predictions on this sample is the most important metric of the model's quality.

The third stage, "decision-making," is about how we use the machine learning model's insights in our daily operations. Individual managers may now have more flexibility in how they use empirical data from data science and other models in the field of human resource decisions than they had in the heyday of the large corporations, when recruiting and other procedures were uniform across the board. Managers nowadays typically have the option of ignoring prediction information, interpreting it as they see appropriate, and gathering their own data on actions such as recruiting through self-structured interviews.

APPLICATIONS OF AI IN HR

Recruitment and onboarding, employee experience, process optimization, and administrative task automation are just a few of the numerous applications of artificial intelligence in the human resources business that HR managers can expect to see.

1. Recruitment and Onboarding

AI is a game-changing technology that helps enterprises to succeed in this era by allowing them to trade off humans for more machine handling in order to recruit high-performing employees. (Geetha & Reddy, 2018). AI has grown into an indispensable tool for recruiters over the last several years, with 76 percent of recruiters anticipating AI to have a significant impact on HR's recruitment function (Verlinden, 2019). The most typical use of AI in HR is to replace manual candidate screening with AI-powered screening to shorten this time-consuming procedure. (Folick, 2016). AI is taking over repetitive and high-volume tasks in recruitment, such as screening candidate resumes, thanks to its innovative machine learning capabilities, which allow it to continuously recruit good candidates from a potential pool by comparing the candidates' characteristics to those of successful current employees (McFadden, 2019; He, 2019).

While some companies are currently employing AI in their hiring processes, the vast majority are not. According to Deloitte's 2019 Global Human Capital Trends study, just 6% of respondents thought their company had best-in-class technology recruiting practices, while 81% said theirs were ordinary or below standard. As a result, professionals have a great deal of flexibility in how they operate their firms and may take use of modern technology.

AI can assist both the employing firm and potential applicants throughout the recruitment process. For example, AI technology may speed up the application process by creating more user-friendly forms that job seekers are more likely to finish, lowering the number of applications that are abandoned.

Artificial intelligence makes it easier for candidates to submit more relevant applications, which has been demonstrated to increase application completion rates.

Additionally, AI has assisted in the reintroduction of candidates. By keeping a database of previous applications, AI technology may analyze the existing pool of applicants and identify individuals who could be a suitable fit for new opportunities as they become available. HR professionals may use this technology to find qualified personnel faster and easier than ever before, saving time and money.

After hiring managers have found the best match for their open positions, the onboarding process begins. AI allows this process to take place outside of typical business hours, which is a huge improvement over prior onboarding techniques.

Instead, AI-enabled chatbots and remote support applications enable new hires to obtain human resources assistance at any time and from any location. This decision not only allows employees to finish the onboarding process at their own leisure, but it also reduces administrative burden and speeds up integration.

2. Internal Mobility and Employee Retention

In addition to enhancing the recruitment process, HR managers may utilize artificial intelligence to enhance internal mobility and employee retention.

Using personalized feedback questionnaires and employee reward programmes, human resources departments can now evaluate employee engagement and job satisfaction more accurately than ever before. Given how important it is to understand employees' general needs, this is highly beneficial; nevertheless, there are several major enterprise benefits to possessing this knowledge.

According to a study published by the Human Resources Professional Association, AI software can analyze key indicators of employee productivity to identify employees who should be promoted, leading in internal mobility. This has the potential to lower talent recruiting expenses while also increasing staff retention.

This technology, on the other hand, isn't just useful for identifying internal promotion opportunities; it can also predict who on a team is most likely to quit. Knowing this information as soon as possible allows HR professionals to put in place retention efforts before its too late, decreasing employee attrition in a strategic manner.

3. Employee Engagement

Every other company's goal is to keep their employees not just happy and pleased, but also engaged. Employee engagement can only be achieved when it is seen holistically, taking into account a variety of factors that begin with the hiring of a person and continue until the employee decides to leave the company. Role clarity, learning opportunities, incentives and recognition, grievance resolution, and employee health and wellness initiatives are all examples of employee engagement. With AI in employee engagement, all of this may be accomplished fairly and evenly.

Real-time enquiries regarding health and other employee perks, virtual assistants on understanding business regulations, and so on may be done with AI tailored learning and development. Employee engagement is boosted significantly as a result of this. Al also assists with the implementation of a continuous, unbiased, and fact-based feedback system. HR may establish and define quantifiable targets for each employee with the aid of AI tools. This simplifies continuous feedback systems and allows them to provide better outcomes. Another crucial aspect is that open feedback, suggestions, and concerns shared by thousands of employees via an online survey can be managed more systematically with AI; AI aids in the analysis of these millions of data points and can predict not only current engagement levels, but also future engagement levels, turnover rates, and performance levels, among other things.

4. Automation of Administrative Tasks

One of the most significant benefits of applying artificial intelligence to various human resource procedures is the same as it is in other disciplines and industries: HR professionals can spend more time contributing to company strategy planning by automating low-value, frequently repeated administrative tasks. As a result, human resources may become a major commercial partner for their enterprises.

Smart technology might automate benefits administration, pre-screening applicants, interview scheduling, and other processes. Although each of these actions is essential to an organization's overall success, the duties required in such processes are generally time-consuming, and the stress of these obligations frequently means that HR professionals have less time to devote to more meaningful employee care.

By automating administrative tasks, AI technology can help reduce this pressure. According to a study by Eightfold, HR employees who utilized AI software finished administrative tasks 19 percent faster than those who didn't. As a result of the time savings, HR employees will have more time to devote to company strategy development. (Geetha & Bhanu Sree Reddy, 2018)

TEN HR TRENDS IN THE AGE OF ARTIFICIAL INTELLIGENCE

The future of HR is both digital and human, as HR directors try to optimize the mix of human and automated labour. As a result, a new HR focus has been established: increasing artificial intelligence fluency while reinventing HR to be more personal, human, and intuitive.

1. The Candidate Experience is improved by Using AI in Combination with Human Intelligence

Many enterprises begin their AI trials in talent acquisition since here is where they see the most significant, quantitative, and immediate results in terms of reducing time to hire, increasing recruiter productivity, and delivering a smoother, easy and intuitive application experience.

One company that has done so is DBS Bank. The DBS Talent Acquisition team created JIM (Jobs Intelligence Maestro) to evaluate applicants for jobs as wealth planning managers.

The most significant conclusion, according to James Loo, DBS Bank's Head of Talent Acquisition Group, is that artificial intelligence may be useful to recruiters. Recruiters can focus on higher-value duties like as sourcing, recruitment marketing, candidate engagement, and managing hiring managers instead of spending hours reviewing hundreds of candidates. Recruiters at DBS even learned a new

skill: training the Chatbot how to evaluate prospects and reply to their queries. In the future, a recruiter's responsibilities may include working with a Chatbot Coach.

2. Human-Specific Skills Will Become Increasingly Valuable

According to the World Economic Forum's Future of Jobs Report, need for distinctly human abilities will rise. The World Economic Forum estimates that 75 million jobs will be lost as artificial intelligence takes over more and more routine aspects of work.

However, 133 million new jobs will be created, many of which will require both emotional and technical expertise, such as technology design and programming.

3. Artificial Intelligence Won't Replace Workers; Instead, It Will Help Them Do Their Jobs Better

Gartner predicts that artificial intelligence will generate more employment than it eliminates. The focus will be on figuring out how AI can help people do their jobs better. According to PwC, 20% of CEOs at US companies with AI initiatives aim to use AI throughout their whole business this year, and they expect AI to reinvent professions and work processes while also improving profitability and revenue. One firm that has already embarked on the AI for HR path is Hilton. Vice President of Global Recruiting, Sarah Smart, explains, "We've cut our hiring time in half by using artificial intelligence to find, screen, and interview candidates. Other business benefits include increasing the diversity of our talent pool and helping our recruiters to locate a high-performing candidate faster. We started our AI journey in 2014, and we think that future AI use cases will include improving new hire onboarding and allowing Hilton employees to relocate inside." Rather than abolishing the role of recruiter, Hilton has decided to invest in upskilling him or her. Consider artificial intelligence as a tool in a recruiter's toolkit that may help them expedite the hiring process without making the final hiring decision.

4. Artificial Intelligence Will Be Used to Create New Jobs

As artificial intelligence (AI) becomes more extensively employed within enterprises, C-suite executives will make it a top priority to generate new jobs.

The Center for the Future of Work at Cognizant Technology Solutions was assigned to the task. 21 Job Opportunities in the Future and 21 More Job Opportunities in the Future These occupations were classified as low-tech, medium-tech, or high-tech throughout a 10-year period, from 2019 to 2029.

5. Having An AI-Ready Workforce Will Be Critical to An Organization's Future Success

As AI advances out from consumers' lives and into the workplace, upskilling non-AI workers on how to cope with AI is becoming increasingly important. To prepare a workforce for AI, five critical steps must be taken:

- Determine the business problem you want to solve using AI and begin collecting data on the problem's current state as well as the key KPIs you want to affect with AI.

- Assemble a cross-functional team of key stakeholders to educate them on the financial benefits of using artificial intelligence to solve crucial business problems.
- Create chances for essential HR roles that will be impacted by AI to learn new skills (such as those in Recruiting, New Hire On-Boarding and Corporate Learning).
- Identify new vocations and skills when AI is employed in the workplace.
- To the performance management and development skills necessary in HR jobs, add a basic understanding of how to utilize artificial intelligence across the employee life cycle.

If AI is deployed in the enterprise, employees will need to be trained on how to interact with their AI team members. This will become increasingly essential, as Gartner predicts that by 2022, one out of every five non-routine jobs would rely on AI (only one years from now). Because workers rely on AI to execute their jobs, having an AI-ready staff will give you a leg up on the competition. Gains in Skill-Based Recruitment While skill-based recruiting may start with a job description modification and the removal of a degree requirement, it also demands a change in how and where a company recruits individuals. Hiring managers and corporate leaders must change their mindsets and seek for new ways to source.

6. At Work, Employees Will Exchange Money for Meaning

According to Gallup, Americans work an average of 47 hours per week, with one in five of us working more than 60 hours each week. Workers are increasingly seeking meaningful work, a firm that represents their values, and a good and healthy workplace.

Workers said they'd be willing to give up 23% of their annual salary for a job that was constantly relevant to them. As a consequence, making work more meaningful is no longer a "nice to have," but a business need. Employees that have a feeling of purpose at work are more productive, diligent, and less absent.

7. Access to Natural Light and Career Development Emerge as Two Powerful Employee Benefits

Treadmill desks, sleep pods, and "bring your dog to work day" are just a few of the fads that have dominated news headlines when it comes to which employee benefits are the most engaging. Companies are also boosting opportunities for internal career mobility and reorganizing the physical workplace to promote employee happiness. Internal mobility and job rotation programmes are becoming increasingly important for companies to keep employees motivated and engaged, especially with more than 7 million job openings.

8. Virtual Reality (VR) Is Transforming Corporate Training

A growing number of learning and development executives across the world are experimenting with virtual reality to train their employees. One of the most intriguing use scenarios is virtual reality for compliance training. Verizon is using virtual reality to train store managers what to do if their store is robbed.

9. HR's Call to Action: It Takes a Team to Prepare for the Future of Work

A major challenge for corporate leaders, according to Deloitte Capital Trends, is the necessity for closer collaboration: functioning as a harmonious symphony of specialists (Verlinden, 2019)

BENEFITS OF AI ON EMPLOYEES, HR PROFESSIONALS AND ORGANIZATIONS

AI plays a significant role in transforming the various HR functions which have benefitted not only the HR professionals but employees and enterprises too.

HR Professionals

There is a widespread belief in the industry that implementing AI in HR would result in the loss of HR positions. In truth, AI does not replace HR experts; rather, AI serves as a support role, allowing HR professionals to focus more on strategic issues by taking over the boring and administrative tasks.

HRs are supposed to spend more time with workers and business partners rather than on tedious chores like searching, filtering through profiles, sorting, addressing frequent and daily employee inquiries, and other administrative and data-related work. As a result of these factors, professionals are able to apply their emotional intelligence to the position, which is still absent in many cases. As a result, it's past time for HRs to relinquish control of the task that they excel at so that they may focus on what they do best.

As a result of AI in HR, HRs may spend more quality time planning and organizing HR tasks, improving efficiency, reducing bias, reducing administrative labour, responding quickly to employee inquiries, and communicating with applicants about their status.

Employees

When a new employee starts at a firm, they will be bombarded with training and orientation programmes that will educate them about the corporate culture, rules, processes, tasks, and employee paperwork. As a result, employees have a tendency to forget key details from their orientation. Employees may obtain any sort of information about rules, clarify concerns about work, vacations, and leave-related queries without having to rely on HRs, thanks to AI and its online platform and chat bots. Existing workers are also trained, which is an ongoing process, and firms have invested in making these programmes more systematic and flexible so that employees may participate at their leisure. Companies also provide personalized training programmes after determining what an individual need in order to increase their productivity and efficiency at work. All of this is only feasible due to AI integration. Except for a few employees, everyone is career-oriented, and they are continuously on the lookout for businesses that provide excellent career possibilities and career management. Companies that have a solid career management system are chosen above those that use AI. AI may efficiently propose internal career options based on an employee's abilities and experience. As a result, employees are exposed to possibilities in a more methodical and non-biased way.

Enterprises

Companies gain from AI integration in HR; one such advantage is a 71 percent reduction in the cost per hiring with the aid of AI in recruiting software, which boosted recruiters' productivity. By guaranteeing equal opportunity regardless of age, gender, or colour, enterprises may minimize prejudice. Most businesses struggle to locate the appropriate people at the right time, which has a negative impact on their production and profitability. Tech firms and startups may obtain relevant profiles using AI and machine learning. Face recognition technology, for example, is capable of recognizing each employee's gender as well as psycho-emotional characteristics. Whether an employee is sad, pleased, very happy, or euphoric, with this information, an enterprise may work to strengthen the relationship and take the appropriate steps to assist workers who are unhappy and understand the causes for their sadness. Employee commitment and engagement will improve as a result of this.

LIMITATIONS OF AI IN MANAGING HUMAN RESOURCE MANAGEMENT

Artificial intelligence excels in analyzing data, providing automatic responses, and automating time-consuming recruitment tasks. However, it is ineffective in determining personality and motivation.

A human recruiter can understand the work style of a boss as well as the team's culture. A seasoned recruiter's sharp eye is usually required to find the right person with the right skill and attitude to blend in seamlessly with the department.

While AI in the field of human resources can provide outcomes, creative problem solving, people management, human interaction, and coaching are important and will continue to require human intervention. Furthermore, while technology may make the recruiting process much more efficient, connecting with sought-after top talent and persuading them to choose your firm over a competitor requires more than canned responses. Chatbots and form e-mails are helpful in the early phases of information distribution, but applicants will need to make a human relationship at some point. (Folick, 2016)

The first step in planning for the negative effects of artificial intelligence is to determine what those effects could be. Listed below are a few examples:

1. Bias in AI

Due to the fact that AI algorithms are designed by humans, they may incorporate bias, either intentionally or unintentionally. If AI algorithms are built with a bias, or the data used to train them is biased, the results they produce will be biased as well. AI algorithms must be ethically designed and trained.

2. Job Losses

While many people predict a net gain in jobs or at least the same number of jobs to be created to replace those lost due to AI technology, there will be vocations that humans undertake now that computers will take over. This will need changes to training and education programmes in order to better prepare our future workers, as well as aiding current employees in moving to new jobs that will allow them to use their unique human abilities.

3. A Shift in Human Behaviour

The enhanced flexibility afforded by AI taking over boring duties and allowing individuals to spend significantly less time at work may appear to be a utopia at first glance. Humans, on the other hand, will have to channel their newfound freedom into new interests that provide the same social and emotional benefits as their former jobs. It may be simpler for some people and groups. There will undoubtedly be economic difficulties when computers take over duties that people were previously paid to perform. On profit and loss statements, the financial benefits of increased efficiency are obvious, but the larger benefits to society and the human condition are less so.

4. International Rules and Regulations

While technology has made the world a smaller place than it has ever been, it also means that AI will require new rules and regulations to ensure safe and successful global interactions. Because we are no longer isolated, actions and judgements relating to artificial intelligence in one country might easily have a detrimental influence on others. We're already seeing this play out, with Europe taking a tight legal approach to assure authorization and transparency, while the United States and, in particular, China, allow its companies to utilize AI considerably more freely.

5. Hacking in a Hurry

Artificial intelligence pushes the boundaries of what is possible, and in many cases, it exceeds human ability to keep up. With automation, immoral acts like phishing, virus dissemination to software, and taking advantage of AI systems due to their worldview may be difficult to identify until a true problem emerges.

6. Terrorism via Artificial Intelligence (AI)

New AI-enabled forms of terrorism might arise as well, ranging from the proliferation of autonomous drones and the introduction of robotic swarms to remote attacks and disease transmission via Nano-robots. The threat they represent will need our law enforcement and defence institutions to react.

To ensure that, while there is a danger of negative repercussions from wider adoption, they are minimized to the maximum extent possible, it will need time and substantial human thought to determine the best strategy to prepare for a future with even more artificial intelligence applications. (McFadden, 2019)

LITERATURE REVIEW

Abdeldayem & Aldulaimi (2020), in the present age, there have been many advancements in the field of information technology; in this regard, a new invention known as Artificial Intelligence has been launched (AI). In the digital world, for example, human understanding of Artificial Intelligence has become a critical element in an organization's ability to adapt and survive in a changing environment. Artificial intelligence technology may also assist businesses of all sizes in achieving their development goals. Although artificial intelligence has a role in software engineering, it is not the same thing. It often

includes human science, brain science, arithmetic, and other connected disciplines, as well as skilled hypothetical knowledge and skills in specific application sectors and human experience collecting in associated fields.

Pillai & Sivathanu (2020), Starting from this point of view, artificial intelligence has a broad scope and multidimensional character at the hypothetical information level, and it will not fit into any particular field of knowledge.

Chakraborty et al. (2020) IT, as a critical business tool for certain companies, is on the minds of many people, particularly professionals and academics. It now wins almost every major commercial movement in a variety of industries, including banking, internet commerce, the travel sector, and travel .It is also the destiny of such organizations, which have both tech-friendly and tech-subordinate natures. In particular, when it comes to e-HRM, it will almost always maintain its benefits in terms of representative management throughout time. What's more compelling is that there's a global initiative on to improve IT quality with the help of AI or reciprocally intellectual figuring.

Bhardwaj et al. (2020), The Japanese Cabinet announced Society 5.0, a continuous effort aimed at bringing about societal transformation. This innovative project aims to achieve a substantial degree of human-machine communication. It intends to connect people, things, and frameworks over the internet, with commands being detected by sensors and carried out by AI. Unlike the concept of Industry 4.0, Society 5.0 is not defined by the manufacturing industry, but rather infiltrates public life with the intertwining of AI, the Internet of Things, extended reality, and robotics.

Nawaz, (2020), HR has gained new energizing capabilities thanks to artificial intelligence and application autonomy. Face recognition, voice & biometric, recognizable proof, picture acknowledgment, tuning in to sounds and feelings, and unravelling video conference to learn the qualification profile, communication & cognitive skills are all examples of current programming. AI-based algorithms select the best candidate, present career options, and provide a complete picture of skills to improve leadership, psychological, and emotional intelligence.

OBJECTIVES OF THE STUDY

The purpose of the study is:

- To understand the benefits of AI with respect to the employees, organizations and HR Professionals.
- To analyze the AI life cycle in the field of human resource management and its applications in HR.
- To determine the top ten HR trends in the age of artificial intelligence.
- To study and analyze the limitations of AI in managing Human resources.

SCOPE OF THE STUDY

In today's world, Artificial Intelligence has become extremely popular. It is the replication of human intelligence in robots that have been designed to learn and imitate human behaviours. AI has its applications in various sectors also such as finance, data security, travel and transport, gaming, agriculture, healthcare, social media, astronomy, and businesses etc. This study is only confined to Human Resource.

FINDINGS OF THE STUDY

The study's results showed how AI has been incorporated into various HR tasks and how it has improved the function's effectiveness and efficiency. The report also emphasizes the many advantages that AI integration provides to workers, HR departments, and organizations. The results demonstrate why AI should be incorporated into all HR operations by all businesses. According to the results, the majority of businesses have heavily invested in AI in the recruitment and selecting process, since this is the most time-consuming activity. Processes like as recruitment, initial screening, interview scheduling, and subsequent processes may all be done online with the assistance of AI. HR efficiency has improved significantly as a result of this. The onboarding process, which is once again a lengthy procedure involving a lot of paper work and time, is the second function in which AI may be observed. These tasks are automated with the assistance of AI, and they are made quicker with the help of an online platform. In terms of other functions, the majority of businesses are still in the testing phase.

CONCLUSION

Many HR functions are being taken over by AI, however this does not indicate that AI is taking over HR positions and replacing HRs, which is not the case. HRs have a lot of administrative work to do, including job postings, sourcing, screening, arranging meetings and interviews, creating timesheets, documenting and confirming accounts and other costs. Of course, if this can be entirely automated using AI, it would greatly help HR professionals by freeing them up to focus on strategic thinking, creativity, connection building, emotional intelligence, and better problem solving. AI has a bright future in HR, but integrating it presents a number of obstacles that must be solved before a firm can fully benefit from it. AI can only function like a person if high-quality data is collected and given; otherwise, the results may be incorrect. As a consequence, gathering all people-related data while integrating is a lengthy procedure, but it is only the first hurdle. Second, the confidentiality of company records and policies must be protected so that they are not exploited, and necessary precautions must be made to keep them private and safe. Finally, while AI will not be able to do tasks perfectly, it will be able to reduce human mistakes and prejudice to a large amount. Despite these obstacles, many enterprises are attempting to integrate AI into HR since the benefits outweigh the hurdles. As a result of this qualitative study, AI and HR are no longer oxymorons. Although India is trailing behind in the field of AI and HR, the possibilities and tools to catch up are there, and it is just a question of raising awareness about the transformative advantages of AI for HRM. Overall, the study found that combining AI with HR is a good development that HR professionals can utilize to boost their influence in the company by allowing them to serve as powerful strategic partners.

RECOMMENDATIONS

- HR departments must strike a balance between cognitive technology advances and openness.
- To avoid unintentionally introducing bias into their programmes, HR executives and practitioners must have a comprehensive knowledge of how choices are made.

162

- Companies should take steps to make sure that the HR personnel who will be using the technology are equipped with the skills before the integration rather than taking up a learning on the go approach.
- Companies need to provide proper training to employees before the implementation in order to impart all the necessary knowledge and skills required to not just use the AI tools effectively but also troubleshoot problems that may arise during the usage of the technology.
- For HRs looking to integrate AI with their HR functions one of the key steps would be to identify the possible barriers that may prevent or hinder the transition.
- Companies need to help employees see AI as a tool to increase their performance rather than as a threat to their jobs.
- Companies need to ensure that they also have the financial and infrastructural capabilities to support the AI systems along with other resources required to integrate AI into the HR functions.

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Chapter 11
Information Technology in Supply Chain Management

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ABSTRACT

The process of producing and selling items, from the beginning of delivering raw materials till their end of production and sale for consumers, is referred to as a supply chain. In the present era, supply chain management has also transformed according to the requirement and changing complexities. It is a netting of businesses that work together so that things like logistics, stock management, transport, etc. go as smoothly as they can, including suppliers, manufacturers, carriers, distributors, and retailers. Companies have been trying to develop ways of enhancing flexibility and reaction and competitiveness by changes in their operational strategies, processes, and technology.

INTRODUCTION

Keith Oliver coined the phrase "Supply Chain Management" (SCM) in 1982 for the first time and used it in the Financial Times public interview. Such systems developed integrated systems to enhance specialist supply chain alliances by means of original equipment manufacturers and were further re-enhanced by several domain specialists throughout the world (OEM). In general, we now have several supply chain models, which correspond to the company's business needs, because of these systems. These models and their applications are as follows. The Agile Model is excellent for companies dealing with specialized commands. In a high market demand, but with minor fluctuations, the continuous flow model delivers stability. The Custom Configured Model offers individual production and assembly setup. For companies

in highly competitive marketplaces and end to end efficiency, the Efficient Chain Model is necessary. The Fast Chain Model is suitable for companies with trendy, short-lived items. Flexible model offers the option to meet peaks of strong demand and to control long periods of low volume movement.

A Supply chain deals with the conversion of raw materials into final products and the timely delivery to end customers of the products (Mabert and Venkataramanan, 1998). Supply Chain Management mainly examines the interplay between different functions, processes and chain members and analyses the influence on value added and maximise profit (Ballou, 2007). Information Technology (IT) refers to all the products for which companies make use of computers. This study describes the usage of advanced information technology in supply chain management by integrating them at the various stages of the same. The study helps us to understand the importance, effectiveness and efficiency by the usage as well as the implementation of the new age Supply Chain coined as 'Supply Chain 4.0'.The study helps us understand the trends in supply chain and utilise the same for the greater advantage of organisation. It also talks in detail about the collection, management and organisation of data irrespective of its mode of collection(that is machine or human) to improve efficiency as well as bring about an unhindered flow of work at all stages of the supply chain.The integration of data helps us to understand the importance of uniformity in data presented to all softwares and humans at every stage of the supply chain. The improvement of physical process execution makes it appear as guess work and gut work by humans are less effective when compared to the data in hand.The study gives us a clear-cut idea to increase operational efficiency by using the six value drivers which includes physical flow, performance management, supply chain strategy, order management, collaboration and planning.

REVIEW OF LITERATURE

In order to optimise supply-chain flow decisions to achieve organisational competitiveness, to improve higher service standards, to decrease inventory, supply channel costs and to reduce electrical risks, the exponential expansion of IT in the area of supply chain management (SCM) through communication technology is important[1]. IT in the SCM is also necessary to facilitate integration and effective sharing of information across and across organisations. The companies today are working towards a virtual supply chain by using quick technological advances and IT applications that includes: Electronic Data Exchange (EDI), Radio Frequency Identification (RFID), Bar code, Electronic Commerce, Decision Support System, ERPs, etc. It also works readily in e-risk reduction. The fundamental focus of this study is to understand the function and implementation of IT in the e-risk management and reduction of the supply chain.

The use of information technology (IT) is necessary for the effective control of today's complicated supply chains and is considered to be the main advantage of integrating IT. The amount of empirical studies which analyse IT use in the supply chain is limited but has shown positive outcomes. This article proposes a taxonomy of how organisations use IT in SCM and investigates causes for these distinct types of use based on empirical information from 16 Finnish industrial and service companies (McKinsey& Company, 2020). The results of this research indicate that IT use for SCM-related reasons is classified into transaction processing, supply and cooperation chain planning and order monitoring and delivery coordination. The results imply further that the drivers in SCM differ from these three IT uses.

Supply chain management has become a method of management that is increasingly vital for companies to better their business. Even though ICTs are employed widely in supply chains, the methods via which IT generates value are not shown to be systematically demonstrable. Moreover, because supply chain targets go beyond business efficiency to achieve higher-order goals, such as market dynamics understanding and the discovery of new partnership agreements to provide a greater value to customers, researchers and practitioners must be well aware of the capabilities needed for supply chains to maintain their competitive advantages. To fill this gap,this research explores the impact on supply chain performance of communal knowledge management. Based on the Company's resource-based perspective and the relational perspective on the company's competitive edge, this dissertation presents an IT capabilities framework to facilitate/inhibit the knowledge management capacity of the supply chain.

Fundamental changes have occurred in today's economy (Ranga Reddy et.al.2015). These changes affect our interaction with our customers, suppliers, business partners and employees. It indicates that information technology improvements have given organisations unparalleled chances to achieve a competitive advantage. The article focused on the role of IT in today's complicated management of the supply chain. There will be discussion of critical IT contributions and drives. Research findings in 14 industrial and service businesses have shown that use of IT for SCM purposes may be broken down into transaction processing, supply chain planning and cooperation as well as order tracking and delivery coordination . In today's economy, fundamental changes took place. These changes modify our relationship with clients, suppliers, business partners and colleagues. They transform our relationship. It also outlines the way in which IT innovations have given corporations unparalleled competitive advantage. Information Technology (Vikarm Sinhaet.al,2015) revolution changed the world and all aspects of business processes. The improvements in IT have led to numerous conceivable alternative options for the proper management of the supply chain. Management of the supply chain is a function driven by data. The supply chain management provided by information technology will offer a business a competitive advantage over other competitors on the market. In decision-making processes, IT plays a crucial role. IT is advantageous for supply chain cooperation and coordination. The article presents the overview of information technology for efficient supply chain management, supply chain-specific software-centric features and IT instruments used in the administration of supply chains. Information technology (Sharma. R., 2017) and its uses in organizations are very popular in every country. It also encompasses the contribution of IT to assisting the complete supply chain management system to achieve improved levels of service, lower inventory levels and reduced supply chain expenses. IT is helpful to organize and integrate the supply chain stakeholders. The operating cost of supply chain management will mostly be reduced by IT. This helps to make good decisions about processing and planning transactions. Information sharing through two-way communication between participants within a supply chain is one component of the implementation of supply chain management. As a result, most companies are investing in developing a computer hardware, software, and connective electronic data Interchange (EDI), BarCode systems (BCS), enterprise resource planning (ERP), and intranet, extranet, and internet to create an adequate IT infrastructure for the supply chain integration. A key enabler of effective supply chain management activities is Supply Chain Information Technology (S. Harnowo, 2015). In 2013, companies worldwide spent $300 billion on Supply Chain Information Technology, rising by 1.8% and 3.8% compared with 2012 and 2011, respectively. If the supply chain information technology does not function as intended, companies are at risk of deteriorating financial performance with such major expenditures.. The existing literature has in particular produced inconsistent outcomes with regard to the association between information technology supply chain and company performance. This dissertation

is therefore intended to systematically study the role of IT in the supply chain management and shed light on this extremely significant field of research. Researchers have been focussing on Supply Chain Management ʿKumar.V.2014) during the past decade since many firms believe that good Supply Chain Management is essential to creating and maintaining the competitive advantage of their products and services. Companies have to develop a supply chain management strategy and apply relevant supply chain management techniques in order to manage the supply chain. However, various methods and practices of supply chains management require the support and use of suitable IT tools. There is therefore a need to match these applications and their use to the supply chain strategy and practices of the company in order to properly manage the supply chain. Likewise, previous studies on Supply Chain Management have detailed supply chain strategies in a large way, without mentioning their implications for the usage of IT. In addition, numerous studies analyzed the significance and their influence on the supply chain and corporate performance of the Supply Chain Management Practices without determining the equivalent use of the information systems needed to apply them more effectively. Therefore, studies are necessary to investigate the relationship between supply chain management and IT use. This study attempts to study and understand the phenomenon employed by IT for integration into the supply chain and examine the effect on the performance of supply chain management on information system integration considerably.

Information technology (R. Nair, 2019) has been an important determinant of the competitive advantage for many companies and their utilization in firms and throughout the supply network. The article concentrates on the application of supply chain management information technology. It also underlines the significance of IT to restructuring the entire distribution to achieve improved level of service, reduced inventory and lower supply chain expenses. A general review and real advantages of the commonly used existing IT tools focus on existing configuration concerns, applications available. The role of existing communication technologies in making information technology supply chain management possible by addressing a range of points and corporate solutions in a range of supply chain scenarios. Demonstrations and implementations in Supply Chain Management are explored in critical information technology. In today's economy, fundamental changes took place. These changes affect the interaction with its customers, suppliers, business partners and employees. In the context of increasing global competition, a reflection on emerging and evolving trends in information technologies such as RFID, Web services, electronic trade, virtual supply chains, and decision support systems further emphasize the importance of information technology. The quick use of the Internet in order to communicate with all stakeholders seems to highlight the promise of the new-age media. The document (Kauremma.J. 2016) is aimed at increasing the understanding of the critical management and technical decisions about the design of inter-organizational supply chain integration information systems. To that purpose, the authors describe and suggest a framework for the designing of inter-organizational information systems for integration of Supply Chain systems on the basis of the current literature.

Design/methodology/approach – The paper draws on the integration of the supply chain and cross-organizational information systems from previous literature and builds a conceptual context that illustrates empirical examples of three case studies on a 10-year e-Business research programme for the supply chain integration. Findings – The authors suggest, based on previous research from a number of areas, a framework that brings together the management viewpoints and the authors believe that these opinions constitute the basis of the three main aspects of interorganizational information systems for supply chain integration theory, namely purpose and scope, design principles and technical framework. The authors also propose that flexible differentiation between use contexts, largely by partners and inter-organizational

focus processes, is the fundamental thread tying decision-making in all levels – aim and scope, design principles, technological frameworks.

RESEARCH OBJECTIVES AND METHODOLOGY

- To study the significance of integration of Supply Chain Management and Information Technology.
- To identify the shortcomings of the existing supply chain and make amends using information technology.
- To comparatively study the efficiency of the supply chain that is integrated with advanced information technologies.
- To understand the value drivers of supply chain and integrate technology to increase operational efficiency.

The study is primarily based upon the secondary data. Data was collected from relevant journals, books & newspapers. Mainly data was analyzed to know about the significance of advanced information technology in supply chain management.

DATA ANALYSIS

In the last three decades logistics has undergone a tremendous change: from a purely functional to sales and/or production, focusing on the supply and supply of production lines for customers, to an independent supply chain management function, already led by the chief supply chain operator in certain enterprises. In many companies the focus has migrated from supply chain management on advanced planning processes like analytical demand planning to Logistics Service Providers.

Trends in the Management of Supply Chain

Industry 4.0 generates an incident and calls on organizations to reassess how the supply chain of its firm is designed. There are several technologies that have replaced the traditional working methods. Moreover, the entire trend changes according to customers' expectations. Aside from adapting, supply networks can also reach the next level of efficiency, It can also turn the organization into a digital supply chain by utilizing developing business models.

A variety of megatrends influence the management of the supply chain: rural areas around the world are growing constantly and wealth shifts to areas not previously covered. Pressing for socio-economic reasons to reduce carbon emissions and traffic laws are adding to the issues faced by logistics. However, shifting demographics contribute also to lower work availability and increased ergonomic conditions as a result of an increased worker age. At the same time with the growing client expectations: there has been a sharp increase in service expectations due to increase in order granularization and the growing trend in online services which offer high convenience to customers. The tendency towards individualization and customization has driven substantial growth and modifications in the Stock keeping Unit portfolio (SKU). The supply chain competitiveness is driven by the wide availability of products for shopping and

169

high transparency offered by e-commerce sites. In order to capitalize on these trends and manage with changes in demand, supply lines must become much faster, more granular, and more accurate.

Vision of the Future State

Supply Chain digitization makes it possible for businesses to fulfil consumers' new demand, supply-side difficulties and remaining efficiency improvements and expectations. Digitization creates a 4.0 supply chain that is more quickly. New product distribution systems cut to a few hours the delivery time for high runners. Advanced forecasting approaches based on external data (e.g. holidays, market trends, weather), predictive internal analytics (e.g. demand) and machinery status information for spare parts demand, A far more precise projection of customer demand is provided on the basis for these services. Predictions are made for highly swiftly moving products not on a monthly basis, but every week and every day. The Amazon patent "predictive shipping" will be witnessed in the future where the products will be dispatched even before the order is placed by the customer. After being dispatched, the cargo is matched with the customer and is directly forwarded through the logistics network according to their region or returned back to the owner or supplier when unused.

Real-time planning and Ad-hoc provides an adjustable response to changing demand scenarios and supply. Planning cycles and frozen periods are shortened and planning can continue to dynamically adjust to new requirements or limits (e.g. Production capacity feedback in real time). Once things have been dispatched to the most comfortable location, clients have additional freedom in the delivery process. The flexibility of the supply chain organization is increased through new business models, such as the transport management service or supply chain planning services. The supply chain may be purchased as a service and paid for by use instead of having the resources and skills in-house. The knowledge and concentration of the service providers allows them to produce size, breadth and profitable outsourcing possibilities.

For example, Like UBER, a crowd sourced logistic capacity will greatly improve the agility of the wide distribution networks. New transport methods, including the delivery by using drones, will allow companies to efficiently manage high density objects in the last mile. The spectrum from the synthesization of key measures of performance, such a global level of service, to the extremely detailed process data, for example the correct positioning of vehicles in the network. This data range is a common basis for all tasks in the seniority and supply chain. The integration of a suppliers' chain cloud enables all stakeholders to control and decide on the same facts. This includes data suppliers and service providers.

Clean-sheet model, transport or stock models are employed in digital performance management systems in order to automatically establish objectives. In order to maintain objectives in the event of a disruption to the supply chain, systems automatically alter aims that are no longer achievable at a realistic level of aspiration. In a closed-loop learning approach, performance management systems can "read" and automatically change the supply chain parameters to detect hazards or exceptions. This enables the independent performance management control system to manage a wide variety of disruptions without human intervention and only for important or dangerous problems, the system will alert the human operator. The automation of both physical operations and planning will enhance the efficiency in the supply chain. With the robots handling the material automatically (pallets/boxes and individual parts), from receipt/unloading to pick-out, packaging and delivery. The robots will be able to handle all the materials. The products within the network are transported by independent carriers. Inter-company transport integration and optimization is used to share capabilities within a group of businesses in order

to maximize vehicle use and boost transport flexibility (Ballou, 2007). In order to provide the optimal adaptation to the business requirements, the network is constantly optimized.

Different transparency and dynamic planning tactics can be employed to encourage advanced demand shaping to ensure an appropriate working load in the supply chain. (e.g. unique offers for delivery time slots that involve trucks that are operated underutilized).

Preventing the Potential of Supply Chain 4.0 from being Leveraged by Digital Waste

Many sources of digital waste (besides current waste) that thwart the capability of the supply chain 4.0 can be discovered in current running supply chains. It is necessary to understand the source of waste and in future solutions to reduce/prevent waste should be devised. Digital waste sources can be divided into three different types:

1. Management and the Collection of Data

Data are frequently handled manually (system data collecting, paper database processing, etc.) and are not updated in a timely manner, e.g. Data on lead time entered once will stay unchanged for many years, and sometimes these numbers are just mute numbers. Another example includes the underutilized data on advanced shipments which can greatly improve the efficiency.

Typically, in addition to these examples, it is unclear to use information that are capable of improving the supply chain, e.g. sensing disruptions of supply – when a provider's processing time is constantly increasing, an alert that can bring the attention to one of the members about the situation will make it possible for them to alleviate supply disruption early on. This type of signal is currently not recognized by the existing systems and can result in a reduced service level for the suppliers every end of the month. In the worst situation, it will cause difficulty with the refilling of the assembly line and operational concerns.

2. Integrated Process Optimization

Numerous firms have begun implementing an optimized integrated planning process, however this is typically still done only in silos and not all information is used to get the best potential planning results. Moreover, it is regularly seen that operators manually overwrite machine-determined statistical projections or planning data. Manual overwriting usually has a negative effect on the predictive correctness, especially for machinery moving at high speeds. In addition to the optimization of intra-companies machinery, process optimizations between companies have not yet been completely used. The organizational configuration, management, procedures, and stimulus in the supply chain should be coordinated within and between partners in order to achieve the highest level of integrated production or process optimization.

3. Execution of Human and Machinery Processes

Today, restocking, warehousing, transport management, and so on are typically done in accordance with human decisions, without using available data, e.g. to enhance pick-up locations within the warehouse. In the span of one to two hours, warehouse transactions are still being managed manually, which does

not allow new orders and dynamic routing in real-time. Also, new technologies like wearable (e.g. Glass) or exoskeletons do not leverage the prospects appearing.

Increasing the Operational Efficiency Leveraging Supply Chain 4.0

Supply Chain 4.0 will greatly impact most supply chain management sectors. In order to integrate the key Supply Chain 4.0 enhancements, it was mapped into six main value drivers. In the end, the enhancements allowed the cost, capital, service, and agility to be changed gradually

Planning

Advanced analytics and Big data as well as data automation will be of major benefit to the supply chain planning in the future. "Predictive analysis in demand planning" and "closed-loop planning" are two example levers with substantial impact.

Checking the analysis in order to determine and model complicated linkages, predicting needs, and planning examines hundreds of internal and external demand impacting variables (e.g., social networking trends, weather, sensor data). These innovative methods significantly increase the accuracy of demand forecasting and often reduce the forecast inaccuracy by 30-50%. In addition, the days of "single truth" with regard to forecast numbers are over – these modern algorithms give the predicted demand volume a probability distribution instead of a single prediction number. This facilitates specific conversations and advanced inventory management methodologies, including upside potentials and downside hazards in Sales and Operations planning.

Highly automated and completely integrated closed-loop supply planning and demand, breaches the conventional limits of the various planning phases and makes it a flexible, constant process. Instead of employing set security supplies, each refueling scheme evaluates the anticipated distribution of the likelihood of demand and refills it for a specific service level — the implicit security supplies arising there from differ with several reorders. The integration of pricing decisions with demand and supply chain planning is an important aspect of closed-loop planning; prices can be altered accordingly to optimise total profit and at the same time to minimise inventories according to stock levels, predicted demand and capacity to replenish.

Physical Flow

By increasing connectivity, improved analysis, additive manufacture and advanced automation the logistics are going to take a major step forward. As the warehouses are automated, for example, we will witness an increase in autonomous and intelligent trucks and changes in warehousing and inventory management methods totally with 3-D printing.

The next generation and their rapid spread through consumer devices with interactive user interfaces that enable touch, voice and graphical interfaces, facilitate considerably better machine integration within almost every process in warehousing operations. For example, Google Glass enables employees to provide guidance on the selection process based on the location. Advanced robotic solutions have emerged in order to improve case selection and single parts selection and to significantly influence the productivity of warehouses through the use of exoskeletons (which can sustain stressed manual activities through the stimulus of human physiology). Overall, warehouse automation becomes considerably more

complete and several warehouses are linked to the loading sites of production so that the entire process is achieved without human intervention.

Self-sufficient and intelligent vehicles will result in a considerable decrease in logistics and product handling expenses while offering benefits for lead times and fewer impact on the environment (Schumann-BolscheD, 2017). In controlled environments like mines or in-commerce like trains and AGVs in warehousing environments, self-guided vehicles are already in service and are expected to continue to increase considerably in the near future. However, in Europe and North America, autonomous lorries for usage on public roads have just been operated with encouraging results.

In addition to automating warehouse activities, additive production will have a major impact on physical movements within the supply chain. 3-D printing has turned out to be considerably more unique in a wide range of corporate applications, including local manufacturing of slow moving replacement parts or instruments. A wide spectrum of printing materials has led to drop in prices and has vastly improved precision and quality drive this progress. The first production installations have now been developed that work only with 3-D printers.

Performance Management

The management of performance is transforming enormously. Although in the past it was a huge task to create KPI dashboards and with KPIs only available at aggregated levels, granular data from both internal and external sources are available in real time. This transforms performance management into an operational procedure aiming at exceptional management and ongoing development from a regular, frequently monthly activity. For instance, planners can indicate critical disruptions to the supply chain and can be further helped by the automatic handling of minor exceptions or potentially large solutions.

Analyzes of automated root causes are an exceptional way. By analyzing this with a set of indicators underpinning it and by carrying out large data analysis, using data mines and machine training approaches, the performance management systems can uncover the main causes of an exception. On a root basis, counter-measures such as the regeneration order is activated or changes in the design systems, such as security stocks, are automatically triggered by the system.

Order Management

Any contact order processing and real-time replanning are two instances of how order management is improved, which result in cheaper costs by automating the effort and more dependability through feedback at each step, and with rapid and dependable responses achieving superior customer experiences.

The following step after developing a dependable ATP process is to process no contact orders. No-touch order processing. By integrating ordering systems, connecting it to ATP and upgrading it with the order rules, the system can be utilised to completely automate the ordering process. The objective is to create a comprehensive "no-touch" procedure where manual involvement between the order intake and order confirmation is not necessary. Master data must be regularly updated which does not reduce the efficiency of the system.

Effective replanning allows confirmation of orders by immediately re-organizing the production schedule in memory and re-enhancing it with all the limitations taken into account. The configuration of the supply chain is therefore always up to date and results in a very trustworthy strategy. In addition,

extra services, such as shorter lead time for a specified premium cost, can be supplied to clients to enable customers to view on one hand the feasibility and updated dates.

Collaboration

Supply chain cloud is the next level of cooperation in the supply chain. The cloud software used in the supply chain is a collaborative and collective supply chain between users, the enterprise and suppliers, providing a common logistical infrastructure or even common solutions for supply chain planning. Partners can choose to work together in non-competitive relationships in particular to minimise admin expenses and to draw on best practices and learn from one other. They will also have the opportunity to work together.

The end-to-end/multi-connectivity is another important area within cooperation. Where some vehicle businesses already have started working together over the whole value chain (for example, between a tanney and the completed leather used in the car), other car manufacturers still need to close that gap. Combination along the value chain makes it possible to generally communicate reliable planned data for considerably cheaper stocks, to change lead time by providing information instantaneously all over the entire supply chain, and provides an early warning system, and to react quickly to disturbances wherever.

Supply Chain Strategy

The need to customise the supply chain till the end, customised supply chain configurations take many more segments. It must control "micro-segmentation" in order to thrive in this situation. A large-scale supply chain offering can be massively personalised based on the minute sectors of the supply chain into a century-round unique supply chain sectors depending on the customer

requirements and own capabilities. Custom-customized items offer optimum client value and assist in reducing supply chain expenses and inventory.

Impact of Supply Chain 4.0

Removing digital waste and adopting new technologies is a big element required to improve operational effectiveness. Over the course of the next two to three years, the potential impact of Supply Chain 4.0 will be enormous, resulting in a downturn of 30% and a decrease in lost revenues of up to 75% and a substantial increase in the agility of supply chains.

1. Supply Chain Service / Lost Sales

A false promise to the customer will lead to low customer feedback and experience (for example, exaggerated lead times), on a mistaken stock profile, or on an unreliable components delivery. Furthermore, lost sales occur when the products requested are not available in the warehouse that is registered in the warehouse datacenter. This leads to the customers opting to switch to a different brand. This applies to both B2C and B2B.

The service level will dramatically increase by improving our customer interactions significantly by providing the available point-of-sale data/market intelligence, significantly enhancing the forecast

174

quality (up to 90% at the relevant level, such as SKU) and applying demand shaping methods together with demand sensing to address systematic changes/trends.

2. Supply Chain Costs

The cost can be lowered by up to 30 percent with the integration of transportation and warehousing with the complete network. Approximately 50% of this enhancement can be achieved using advanced methods for calculating the cost of transportation and stocking of the network - it always has to be a minimum of contact points and a minimum of miles driven, which still meets the necessary customer service level. The potential savings can be obtained together with intelligent automation and improved productivity in storage, on-board units in transport, etc. By leveraging dynamic routing approaches, transport supervisory procedures, using autonomous cars and, wherever possible, 3-D printing, you may reduce residual costs by 15 percent.

3. Supply Chain Planning

Task planning that includes Demand planning, aggregated manufacturing planning, Sales and Operations Planning preparation, and supply planning are frequently time-intensive and mostly carried out manually. 80-90% of planning tasks can be automated and will improve the quality of the task compared with jobs performed manually. The S&OP process must be changed to a weekly pace, and the decision-making process must be based on situations that can be updated in real time. Services, supply chains, inventories and other components have ramifications for this granularity, accuracy and speed. Systems can recognise the exception in which a planner has to involve itself in deciding.

4. Inventory

Inventory is used to disconnect demand and supply, to decouple demand and supply fluctuation. The uncertainty (standard demand/supply deviations or forecast errors) is greatly decreased, therefore making safety stocks unneeded by using new planning algorithms. The other key component in the inventory is the restocking lead time – the lead time is substantially lower with increased manufacturing of lot size and a quick transition. In addition, a large expansion of local-for-local production will reduce transportation time, e.g. from Asia to the United States. Furthermore, 3-D printing reduces the inventory necessary. A total inventory will be reduced by over 75% due to the quick production time offered by 3-D printing. The diagnostic tool methodically evaluates the supply chain on the basis of six values and of five dimensions. It distinguishes between three maturity levels. "Mainly paper based" supply networks with low digitalization describe the Supply Chain 2.0. Manual execution of most processes. The organization's digital capabilities are quite restricted and data are not used to enhance business choices. Supply Chain 3.0 defines "fundamental digital component supply chains in place." IT systems have been established and utilized, but there is still a need to enhance digital capabilities. For the planning / prevention of the digital maturity only simple algorithms are utilized, and only few data scientists are involved in the organization. Supply Chain 4.0 is the highest maturity and utilizes all available data to enhance, speed up, and enrich decision making assistance. A large collection of data along with researchers operate within the organization, following a specific route for progress towards digital mastery, using advanced algorithms.

Transformation into a Digital Supply Chain

Two main enabling factors - capability and environment - are required for transformation into a digital supply chain. Digitalization capabilities must be established in the company, but often involve focused recruitment of specialized profiles, for example (see the chapter on capacity building). A two-speed architecture / organization will be the second important prerequisite. While the companies and IT landscape are set, an environment filled with innovation should be formed with a start-up mentality. The "incubator" must offer a high level of organizational freedom, flexibility along with state-of-the-art IT systems to ensure rapid cycles of solutions are created, tested and implemented. Rapid trial implementation is important in order to receive rapid business feedback on solutions, build excitement and confidence in innovations (e.g. new planning algorithms) and manage upcoming development cycles. The "incubator" is the seed of the organization's supply chain 4.0 - rapid, flexible and effective.

FINDINGS AND CONCLUSIONS

The number of people working in the logistics industry is increasing, according to a report by the International Logistics Council. It predicts that there will be an increase in work availability and ergonomic conditions for workers. In addition, demand for services is growing, while client expectations are also rising.

The above research helps us to infer that the digitization of the supply chain makes it possible for businesses to fulfil consumers' new demand, supply-side difficulties and efficiency improvements and expectations. New product distribution systems cut out a few hours from the delivery time for high runners. The service providers' expertise and focus allow them to generate economies built with scale and scope. The next generation of efficient technologies enables transparency in the whole supply chain in real-time. The robots handle the material from receipt/unloading to pick-out, packaging and delivery. Automation of physical planning and operations enhances efficiency in the supply chain.

Big data and advanced analytics will be of major benefit to the future supply chain planning. The use of Google Glass enables employees to provide guidance on the selection process based on the location of a location, says Dr. John O'Hare-Gill. He says it will lead to more intelligent trucks, 3-D printing and automated warehouses. Self-sufficient and intelligent cars will result in a considerable decrease in transportation and product handling expenses. 3-D printing has become considerably much more significant in a wide spectrum of corporate uses, including local manufacturing of instruments.

The management of performance is actually changing enormously. The next step after developing a dependable ATP process is to process no contact orders. The supply chain cloud is a collaborative supply chain between clients, the enterprise and suppliers. Automation can lead to cheaper costs by automating effort and more dependable feedback for customers. The supply chains must control "micro-segmentation" in order to flourish in this scenario. Custom-customized items offer optimum client value and reduce supply chain expenses. In the end, it is a win-win situation for all parties involved within the supply chain.

The potential impact of Supply Chain 4.0 will be enormous over the next two to three years. The service level will dramatically increase and increase by improving our customer interactions, according to a few reports. This could result in a downturn of 30% and a decrease in lost revenues of up to 75%. 80-90% of planning tasks can be automated and will improve the quality while analyzed with jobs performed manually. The decision-making process is based on situations that can be updated in real time. Data researchers operate within the organisation, following a specific route for progress towards digital mastery.

It is made clear that digital waste sources can be divided into three different types: collection and management of data, monitoring and optimization, and integration. Many firms have started implementing an integrated planning process, but this is typically done in silos and not all information is used to get the best potential results. Two main enabling factors - capability and environment - are required for digitalization. Digitalization capabilities must be established in the company, but often involve recruitment of specialized profiles.

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Chapter 12
Modelling Student Employability on an Academic Basis:
A Supervised Machine Learning Approach With R

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ABSTRACT

With the population growth and the employability scarcity, the placement of students has become a significant concern. Problems of global ageing and miss-match of student skill and knowledge can be witnessed easily. Fewer works of literature are available to predict the placement of students. This study aims to create a supervised machine learning (SML) model to predict the employability of graduates based on their academic scores and streams. The study used the decision-tree technique to create the SML model. The model can predict the placement chance based on students' academic scores and streams with 65% accuracy. Some new theoretical and practical contributions have been discussed.

INTRODUCTION

In today's scenario, placement is the buzzword. Every college and institution strives to achieve the highest possible placement rate. Students are facing a difficult situation as a result of recent technical and economic advancements. Parents and students choose colleges and institutions that assist their children in finding jobs by providing campus placement or placement ready training.

According to the Global talent market in 2020-2030, the developed countries will face global ageing in the next two decades and transform the trend in employment generation. Most of the developed countries, especially G7 countries, will face the challenge of talent shortage. On the other hand, developing countries like India, Brazil, South Africa having surplus talent, which will have a strong employability challenge. The developed countries require around 68 million immigrants during 2010-2050 (IMF and World Bank). According to the United Nations forecast, for the next 50 years, Japan must admit 0.65 million immigrants annually. In the next two decades, the world will need approximately 20.5 million professionals in 2020 and 30 million in 2030 to sustain economic growth. The size of the population is shrinking with a high percentage of older people in developed countries.

On the other hand, the emerging economies population is growing with the predominant younger age group (Strack et al., 2008). The change in the demographic pattern of various parts of the world is crucial for setting up firms. (Goldstone, 2010).

Higher education should deliver a productive labour force to the benefit and growth of society (Knight, 2002). The educational institutions are responsible for preparing students for general skills and make students lifelong learners (Vishwakarma, R., & Srivastava, V., 2020). Today's education system demands that graduates learn technical content at a faster pace. The graduates are expected to develop the "hard" (technical skills) and the "soft" (people skills) necessary to succeed in the workplace (Nagle, 1987). Specific technical skills are required for each job, and industry professionals should teach them during the process. (Evers, 2001).

The role of higher education is highly demanding and is influenced by the industry. Thus, the education system should prepare students for industry fit. Employers are increasingly looking for highly skilled professionals who can be readily deployed in an organization (Employability skills for the future, 2000). It is found that employers have serious concerns about the technical abilities of young graduates (Baxter, 1982). Several studies have observed the impact of technological development and potential requirements in the service and manufacturing sectors. Recent studies have found that the necessities of an engineering graduate are to enhance his team productivity and decision-making skills. Therefore, they need strong technical skills (Baxter, 1982). Employability skills are lacking in the workplace, and employers continue to blame the system of higher education. However, to acquire and retain a job in the current scenario, graduates must enhance the necessary employability skills (Tetreault, 1997). Therefore, higher education should focus on developing employability skills as per the needs and desires of the business and industry requirements (Committee for Economic Development 1985). Therefore, it is necessary to understand the skills needed among the workforce to bridge the gap (Baxter, 1982).

The above chart 01 clearly shows the hiring intent of human resources managers during 2020. The hiring intent of Engineers had 31%, so there a huge demand for the Engineers followed by graduates (26%), management and related vacancy 17%, postgraduate (13%), undergraduate (8%), polytechnic (3%) and industries training institutes (3%)

India being a younger country with more than 50% of its population, falls below 35. However, many of the youngsters are not skilled. This necessitates the need for continuous skill development, especially in the case of professional skill development. The Indian education system is one of the world's largest, with approximately 250 million pupils. In the fiscal year 2019, India has 37.4 million students enrolled in higher education. In FY19, the Gross Enrolment Ratio in higher education was 26.3 per cent. After the United States, the country has become the second-largest market for e-learning. By 2021, the industry is estimated to be worth $1.96 billion, with 9.5 million consumers. According to the 2012 Annual Status of Education Report (ASER), 96.5 per cent of rural students aged 6 to 14 were enrolled in school. This is the fourth year in a row that enrolment has exceeded 96 per cent. India has maintained an average enrolment ratio of 95% for students in this age group from 2007 to 2014.

The employability rate of Indian graduates is shown in the below chart 02. It shows that 46.82% of B. E. and B.T. graduates are placed. Followed by MBA (46.59%), BA (42.72%), B.com (40.30%), B. Pharm (37.24%), B. Sc (30.34%), polytechnic (25.02%) and MCA (22.42%).

Chart 03 shows the rate of employability of Indian graduates from 2014 to 2021. It clearly explains that the employability rate of male graduates was gradually increased up to 2019. However, due to the Covid-19 situation, the employability rate has reduced, especially for male graduates. The male graduate had an employability rate of 48% during 2018, and females had 47% in 2019 and 2020.

A country like India, where 1.3 million engineering graduates can be produced annually, is still facing employability challenges. Developing high potential professionals for the growth of the country is the need of the hour. Many infrastructure development programs are delayed due to the unavailability of skilled professionals. The skill development projects must be co-ordinate, and they must focus on national development.

Unemployment is the biggest problem for Indian graduates. The share of the unemployment rate of Indians by their educational level is shown in chart 04. Among that, 16.30% of graduates had no placement followed by 14.20% postgraduate, certificate (11.30%), diploma (11.10%), higher secondary (7.40%), Secondary (4.20%), and followed by others.

In the coming decades, the world will face a significant challenge called the "Global silver boom". It will affect the social, economic, political, and technological movements of the world. As a result, most Western industrialized countries will face a significant challenge in finding high potential talent to carry forward the innovation and growth at the current pace.

Given the above severe unemployment problem, few pieces of literature are available to predict the probability of a student's placement based on their past academic record. So, in this chapter, we tried to address this gap and developed a model by using a decision tree to predict the chance of students being placed based on their past academic records.

LITERATURE REVIEW

This paper focused on the significant factors of checklist or decision support that are highly needed to inculcate the students' employability on an academic basis. While going through the different aligned and unaligned reviews of authors, the researchers came on to some critical reviews of authors. The modeling is consider better approach to for future familiar issues (Srivastava, V., & Srivastava, M. K., 2021). As per the topic of the research, the primary vital areas where the tree lies on to the course percentage, academic Industry interface, faculty contribution on academic and the central part is the

motivation of the students while learning a particular course (Rizvi, I. A., Aggarwal, A. (2005,) due to the updated technologies and learning/ teaching pedagogy, the institution must focus on the students on the practical dimensions & knowledge. Institutions should also focus on to what extent the surrounding corporate wants from the students to make them shortlisted and facilitate more employability in the corporate world. For this, institutions must make employability skill programs to acknowledge with various practical approaches, work culture, situational analysis etc. (Gowsalya, G., & Kumar, M., 2015) since employability is one of the significant factors of every institution and is expected to place all the students at the appropriate positions. The Decision tree is rightly used to predict employability based on graduation and other parameters like management abilities, academic performance, merits, extracurricular activities etc. (Mishra, T., Kumar, D., & Gupta, S. (2016). Students' employability prediction model through data mining was also used in various other domains. By keeping the different views of the multiple authors, one of the significant factors which is constantly required in every domain of the academic and job-oriented approach in terms of employability by also including the academic factor is none other than is Communication skill. The ability to communicate is essential in any situation (Tyagi, A., & Srivastava, V., 2012) for an employability framework. The Communication skill needs to focus on the demonian area of expertise, commands, and language proficiency. If any of these factors become inadequate, like lack of skill, knowledge, and low confidence, this will lead to unemployment (Bharathi, A. V., 2016; Kulkarni, N., & Chachadi, A. H., 2014).

Employers should also explore and change their perception of the selection process while hiring newly graduated employees for their organization (Chhinzer, N., & Russo, A. M., 2018). Therefore, predicting the employability via a Decision tree is found particularly useful and valid in different domain areas or factors while looking onto the initial package offered to the students based on past academics (Casuat, C. D., & Festijo, E. D., 2019)

In the Indian scenario, where employability is a primary concern for all students and their parents. Most students work hard only to get good placement. Every parent & student looks for good colleges because they feel that a good college will help them get descend placement. Students forget that their record also plays a significant role in placement, and they highly depend only on college for placement. This paper tried to develop a model of placement based on students' academics scores & streams. To date, significantly less study is available based on this model.

RESEARCH OBJECTIVE

This research aims to develop a model using 'R' and a decision tree to predict the employability status of the students based on their records.

RESEARCH STRATEGY

This research work aims to create a 'Supervised Machine Learning (SML)' model to predict the employability of graduates based on their academics scores & streams. The study used the 'Decision-Tree' technique to create the SML model.

Research Method

The research collected the scores of 223 graduate students who got placement after completion of their U.G. degree. Following data were recorded-

Independent Variables

- 10th / Secondary Class Scores (ss)
- 12th /Senior Secondary Class Scores (sss)
- Graduation Scores (gs)
- Graduation Stream (gstrm)

Dependent Variable/ Model Goal

The study recorded placement offer given to students & found a mean placement offer of Rs 2.6 Lacs per annum (LPA). This study aims to create a model to predict when students get the placement offer (po) of Rs 2.6 LPA or more, based on their past academic performance.

Data Processing

Among the collected 223 data, 71 data were found incomplete. As a result, 152 records are used for model development.

Data Analysis and Model Development

In the research 'R' tool is used for data analysis & SML model development. The researcher applied "rpart" package for decision tree analysis and "rpart.plot" for decision tree visualization. However, "rattle" package is also used to make the visualization more customized & interactive.

```
> install.packages("rpart")
> install.packages("rpart.plot")
> library(rpart)
> library(rpart.plot)
```

The dataset, named- 'data', contains 152 records of five features, namely- 10th score (ss), 12th score (sss), graduation score (gs), graduation stream (gstrm). In addition, the script' summary(data)' identified the descriptive of all variables.

```
> summary(data)
  ss         sss           gs            gstrm           po
Min.:0.3440   Min.:0.4180    Min.:0.4880    Length:152     Length: 152
1st Qu.:0.5593  st Qu.:0.5790  1st Qu.:0.5978  Class:character  Class:character
Median:0.6600  Median:0.6270  Median:0.6438  Mode:character   Mode:character
Mean:0.6479    Mean:0.6387    Mean:0.6506
```

```
3rd Qu.:0.7400    3rd Qu.:0.7060    3rd Qu.:0.6943
Max.:0.9600    Max.:0.9030    Max.:0.8800
```

The the above output of script, reflects that, the mean score in 10ᵗʰ grade, 12ᵗʰ grade & graduation of 152 sample units are- 64.57%, 63.87% & 65.06% simultaneously. Moreveover range of marks for all the grades are also almost similar.

The variable 'gstrm' & 'po' found character data. These data types are changed to factor, as-

```
> data$gstrm=as.factor(data$gstrm)
> data$po=as.factor(data$po)
```

The revised data set was tested again by script 'str(data)' and structured found as-

```
> str(data)
tibble [152 x 7] (S3: tbl_df/tbl/data.frame)
$ ss:num [1:152] 0.401 0.83 0.46 0.6 0.62...
$ sss:num [1:152] 0.492 0.784 0.486 0.456 0.59 0.856 0.648 0.574 0.598 0.708...
$ gs:num [1:152] 0.682 0.552 0.599 0.77 0.67...
$ gstrm:Factor w/11 levels "B.A.","B.COM",..: 6 2 6 2 6 2 2 6 7 5...
$ po:Factor w/2 levels "No","Yes": 1 1 1 1 1 1 2 2 2 2...
```

The variables mentioned above are converted into factors. The study tested the normality of all the numeric variables- 'ss', 'sss' and 'gs' as-

```
>shapiro.test(data$ss)
     Shapiro-Wilk normality test
     data:  data$ss
     W = 0.988, p-value = 0.2166
> shapiro.test(data$sss)
     Shapiro-Wilk normality test
     data:  data$sss
     W = 0.97985, p-value = 0.05504
> shapiro.test(data$gs)
    Shapiro-Wilk normality test
    data:  data$gs
    W = 0.98545, p-value = 0.1113
```

The p-value for all the tests was found 0.2166, 0.05504 and 0.1113 for variables' ss', 'sss' and 'gs', respectively. Furthermore, all these values are found >0.05, which prove the normality of all three variables.

The data set needed to divide into training data set 'data_train' and testing data set 'data_test' to create the model. For this study, the researcher split the data set as Training Data Set: Testing Data Set:: 70:30. The script used for this-

184

```
> set.seed(240)
> create_train_test <- function(data, size = 0.7, train = TRUE) {
      n_row = nrow(data)
      total_row = size * n_row
      train_sample = c(1: total_row)
      if (train == TRUE) {
          return (data[train_sample, ])
        } else {
          return (data[-train_sample, ])
        }
      }
> dt = sort(sample(nrow(data), nrow(data)*.7))
      data_train <-data[dt,]
      data_test <-data[-dt,]
```

This script splits the data as – 'data_train' and 'data_test'. Scripts can check the data set-

```
> dim(data_train)
      [1] 106    7
> dim(data_test)
      [1] 46     7
```

The 106 records are found in the training data set 'data_train', where 41 records are found in the test data set 'data_test'. To verify the correctness randomization process, the study used the script-

```
> prop.table(table(data_train$po))
    No            Yes
    0.5188679     0.4811321
> prop.table(table(data_test$po))
    No            Yes
    0.5           0.5
```

In both the data set, percentage of students who got placement offer more than Rs 2.6 LPA are almost identical, 48% & 50%, which verifies the randomness.

After ensuring all the aspects, the below-mentioned syntax is used to build the model-

```
> fit <- rpart(po~ss+sss+gs+gstrm, data = data_train, method = 'class')
```

To plot the decision tree package, "rattle" and "RGtk2" is used.

```
> install.packages("rattle")
> library(rattle)
> library(RColorBrewer)
> install.packages("RGtk2")
```

185

The script 'fancyRpartPlot' plotted the developed decision tree model

```
> fancyRpartPlot(fit, cex=0.6)
```

Figure 1.
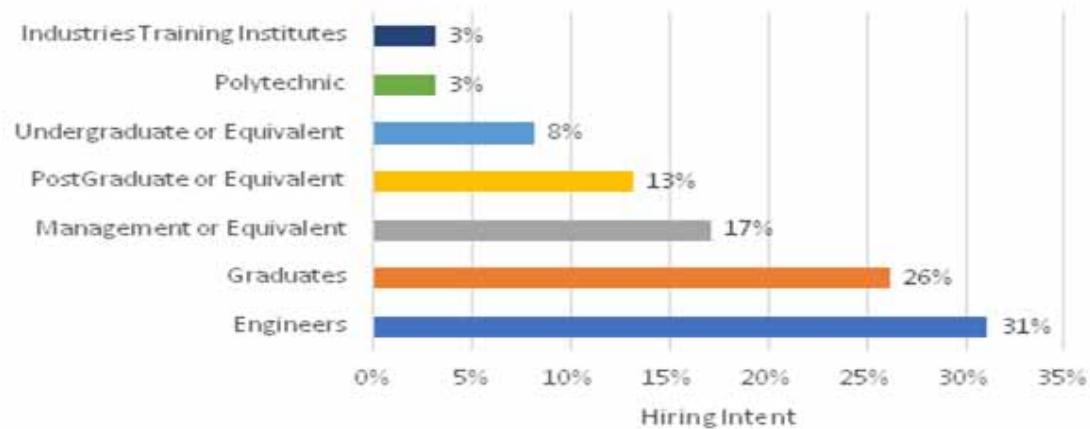
This tree model is tested with testing data' data_test'. The scripts' predict_unseen' is used for this-

```
> predict_unseen <-predict(fit, data_test, type = 'class')
> print(predict_unseen)
> table_mat <- table(data_test$po, predict_unseen)
> table_mat
  predict_unseen
        No        Yes
  No   16         07
  Yes  09         14
```

When tested, this decision tree found that it correctly identified the 16 students who could not get placement offer Rs 2.6 LPA and rightly identified 14 students who got placement offer Rs. 2.6 LPA. However, it wrongly predicted 16 students.

Therefore, the accuracy of the tree is equal to-

(16+14)/ (16+7+9+14) =30/46 =65.21%

The script verifies the value

186

```
> table_mat <- table(data_test$po, predict_unseen)
> table_mat
> accuracy_Test <- sum(diag(table_mat)) / sum(table_mat)
> print(accuracy_Test)
> accuracy_Test <- sum(diag(table_mat)) / sum(table_mat)
> print(accuracy_Test)
[1] 0.6521739
```

To validate the model, the study calculated the complexity parameter (cp). It is the minimum improvement in the model needed at each node. The output of the script-

```
> printcp(fit)
CP              n split rel        error        xerror        xstd
1 0.104575     0                   1.00000      1.11765       0.10065
2 0.078431     3                   0.68627      1.11765       0.10065
3 0.049020     4                   0.60784      1.03922       0.10094
4 0.019608     6                   0.50980      1.07843       0.10087
5 0.010000     7                   0.49020      0.98039       0.10078
```

The outcome of the table reflects 07 splits (Where the value of 'xerror' is minimin). The R tool-'plotcp' is used to visualize the cp-table

Figure 2.
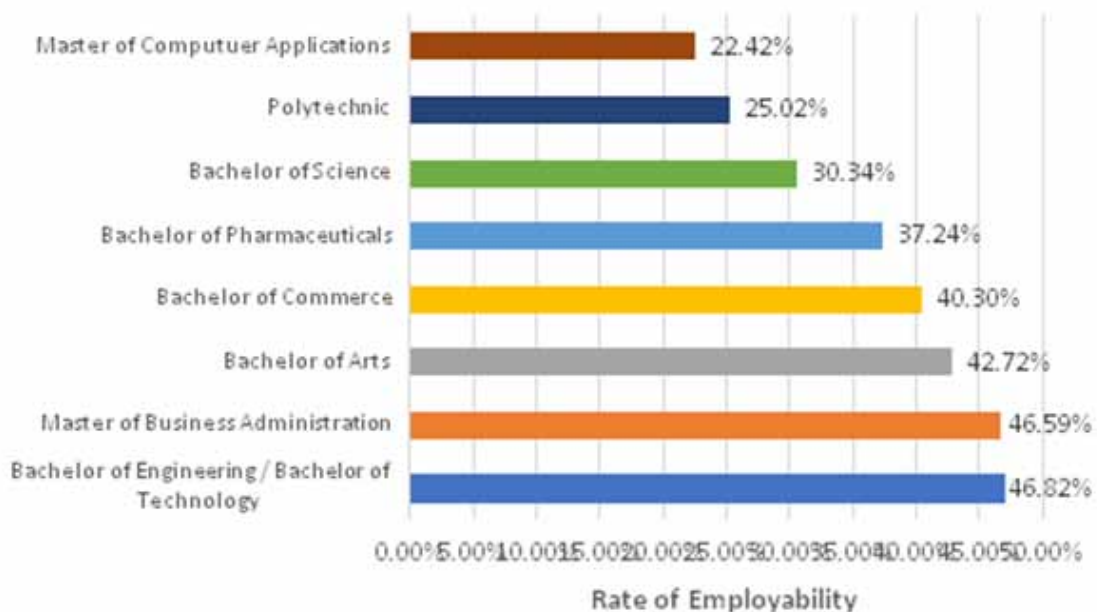
This cp-chart indicates that we can rely on up to 7 splits, or the optimal size of the tree is 7 (The minimum "xerror" value is 0.98039).

To tune further, the researcher used the syntax to control various aspects of fit.

```
> accuracy_tune <- function(fit) {
  predict_unseen <- predict(fit, data_test, type = 'class')
  table_mat <- table(data_test$po, predict_unseen)
  accuracy_Test <- sum(diag(table_mat)) / sum(table_mat)
  accuracy_Test
}
control <- rpart.control(minsplit = 4,
          minbucket = round(5 / 3),
          maxdepth = 3,
          cp = 0)
> tune_fit <- rpart(po~ss+sss+gs+gstrm, data = data_train, method = 'class',
control = control)
> accuracy_tune(tune_fit)
[1] 0.5434783
```

It is found that further tuning of data is decreasing the accuracy of the model. Therefore researcher ignored the further tuning accepted the first model.

However, considering the cp value, the tree is revised to three levels & 7 splits only

Figure 3.
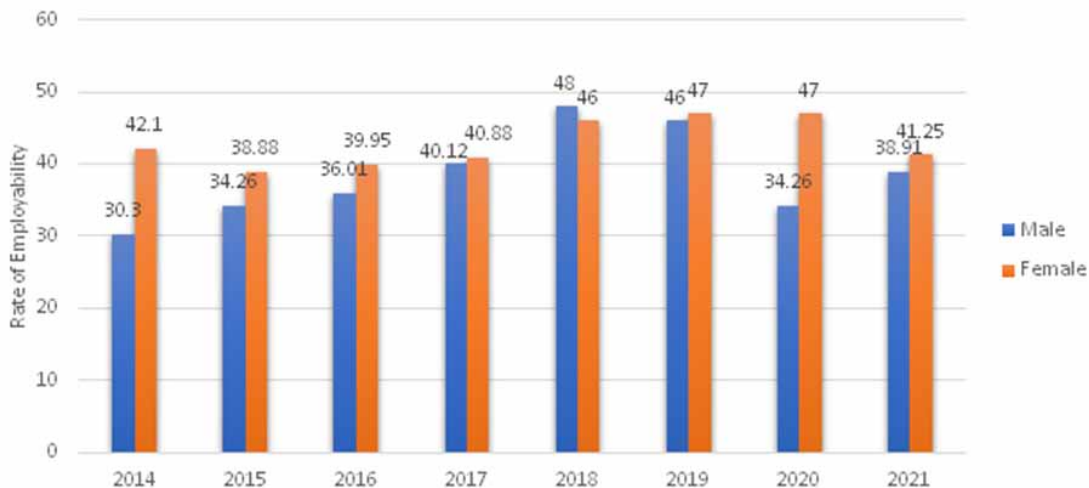
DISCUSSION, OBSERVATION AND INTERPRETATION

The observations from the model are-

- Based on sample data, the model predicts a 52% probability that students will get the placement offer > Rs 2.6 LPA (Node1).
- Based on 14% sample evidence, the model predicts that if the graduation scores of students are => 75%, students have an 80% probability of getting a placement offer, >Rs 2.6 LPA (Node-2). Against this, the remaining 86% sample data predicts that if students fail to earn a 75% score in graduation, there is a 47% probability that they will not get a placement offer of Rs. 2.6 LPA or more (Node-3).
- 12% sample of sample supports the prediction that if the students who scored 75% and above in graduation & 54% and above in 10th class, have 90% probability of getting placement offer Rs 2.6 LPA or more (Root-4), whereas based 2% sample evidence, the student who scores >=75% in graduation but failed to achieve the score >54% in 10th can not get (0% probability) the placement offer of Rs 2.6 LPA or more (Root-5)
- 77% sample evidence-based prediction says that if the students are getting a graduation score <70% have only a 48% probability of getting a placement offer of >Rs 2.6 LPA (Node-6). Unfortunately, the Root-7 of the model contradicts itself by predicting a 100% probability of getting placement offer > Rs 2.6 LPA to students who score 70%-75% in graduation. This is an inaccuracy in the model.
- Root-12 of the tree predicts based on a 24% sample that the students who could score <60% in graduation have only 28% probability to get placement offer > Rs 2.6 LPA.
- 54% of the sample supports a 56% probability that if the students score between 60% to 70% in graduation, they can get the placement offer > Rs 2.6 LPA. (Root-13)

THEORETICAL AND PRACTICAL CONTRIBUTION

First, the integration of high school, intermediate and graduation marks as independent variables and their effect on the placement of students has offered a new theoretical contribution.

Secondly, by the above model, we can predict the student's placement with 65% accuracy. Thus, this study has provided a new theory contribution to predicting the chance of placement quantitatively.

Thirdly, several new relationships were established, which include the relationship between placement & education.

Fourthly, we have successfully developed a relationship between the stream of education and the placement of students. Unfortunately, till now, there are significantly fewer studies that investigated this type of relationship.

This study considered only academic performances to measure the employability in terms of placement offer. Furthure, studies including interpersonal, intrapersonal & technical skills can be done to make this model more exhaustive.

CONCLUSION

This study has effectively proposed and established the placement models of students based on their past academic performance. In this research, a model was developed by taking secondary, senior secondary, graduation marks as independent variables and their effect on the placement of students. In addition to this, these studies also develop the influence of subject streams on the placement of students. So, students can make efforts since from the beginning of shape their career. This study has beautifully and quantitatively established & validated the model of placement based on a different bracket of academic numbers.

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190

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Chapter 13
Narrative Review of Game AI 2000 Onwards and Future Research Directions

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ABSTRACT

The purpose of the chapter is to structure and synthesize the research findings in Gaming AI till date by reviewing the research articles published in high citation, indexed, and peer reviewed journals. Eighteen articles were extracted through systematic process of search and exclusion and inclusion criteria adopted for the study. The selected papers were categorized according to the simulation for AI and AI-based simulation model, and AI applications from literature was reviewed, and conclusions were drawn. Research in Gaming AI is fragmented and unrelated as regards geographical, methodological, and disciplinary aspects. Gaming AI is an emerging research area which is gaining interest in recent years though very little quantitative or qualitative research has been undertaken till date. Recommendations on future research directions were made.

INTRODUCTION

Artificial intelligence is used to process necessary information to execute intelligent reasoning comparable to that of humans. Artificial intelligence is a broad term that encompasses a variety of technologies. AI is referred to as "cognitive technologies'' since it is a group of technologies that have the ability to perform tasks which normally need human intelligence. What differs with AI is its ability to learn from data sets and adjust according to its behaviors to optimize outcomes rather than following and implementing a set of processes and rules. (Deloitte, 2017; Quantum, 2017).

"Game AI" includes Programming and design techniques like neural networks, finite state machines, path finding, models of emotion and social situations, and decision-tree learning, "Game AI'' refers to a "intelligent" behavior that makes the with its desires which appears to respond to a player's actions which appears connected to the meaning of the player's actions (Matas, 2003).

In the area of Game AI, there is a lot of research going on. It may be used in various domains, including adversarial planning, real-time reactive behavior and planning, adversarial planning, and decision-making under situations to help address challenges. (Cabrera et al., 2015). It involves choosing or mapping complex strategies, refining and defining components, inventing move sequences which are contextual, and responding to human actions at the strategic level are all issues that gaming environments encounter. Various aspects of a game's virtual environment which includes characters, objects, sound, lighting, camera and sound, are situated at the interface levels. This altogether hampers the facilitation of interaction. The current state of machine learning, especially in computer games, is formulated chiefly and produces intelligent characters that are human-like. This focus is carried out irrespective of complex opponent behaviors that emerge through various learning techniques. However, research on whether these behaviors add to the player's enjoyment is yet unclear. Researchers hypothesize, for example, based on the various amounts of multi-player online games played regularly, that developing human-like opponents enables the player to obtain more satisfaction.

Within the game AI field, Yannakakis and Togelius identified ten essential pieces of research. The researchers were more concerned with the relationships between them and the influences and interconnections they had on one another. The Game AI textbook, published in 2018, provided a better understanding of game AI. The research had three essential components of game AI. In procedural content generation (PCG), non-player characters (NPCs), procedural level generation (PLG), and player experience modeling. Real-time strategy games, which make up most video games, are also utilized as test-beds and frameworks in this process. This is done to test new AI algorithms for real-time strategy and AI.

The study's research aims are as follows:

1. What are the aspects and ideas of progress in the Game AI literature?
2. What are the recommendations for enabling Game AI implementation?

METHODOLOGY

Articles were extracted from reputed publishers, indexed databases and web resources (Google Scholar, Wiley Online Library (Wiley-Blackwell), Taylor and Francis online Science Direct/Elsevier, Springer Journals Database, Sage Journals) and screened and classified using the process of exclusion and inclusion (Figure 1)

The following criteria were used to choose articles for this review:

"Artificial Intelligence"/"Machine Learning" in "Gaming/Simulation" and "Game AI."

Publications from 2000 onwards and up to April 2021 were selected for further review as articles previous to 2000 could not be found in the literature by the authors. Research Papers published in group and high-quality journals, review articles, and conference proceedings with a high citation index were evaluated.

Meta-analyses, Ph.D. and master's thesis, and opinion papers were excluded from the study. In addition to the term-based search, individual analysis of abstract and article was conducted to identify

themes that did not suit the methodology. Books, volumes, reports, dissertations, and other publications were removed from this study since it was limited to peer-reviewed articles and conference proceedings to strengthen the review's reliability. To extract papers from databases, Artificial Intelligence, Machine Learning, Gaming, and Simulation were used.

(Table 1) displays the 18 primary papers that were chosen for the study. The first one was into the domain of application of AI, i.e., simulation for AI, and the second one was AI for simulation and applications of AI in gaming. Further elaborate that includes entertainment metrics, adaptive online learning, user modeling in computer games, and real-time emotional flow by two experts from academics and industry.

The method adopted is scriptural narrative synthesis (Xiao, 2017). It is based on realist evaluation technique (Lucas, 2007). It entails a systematic examination and synthesis of numerous findings from peer-reviewed journals and textual and word-based analysis. This is also used to summarize and disseminate the results (Popay et al., 2006). The conclusion is a synthesis of current literature and knowledge regarding the research undertaken. This type of analysis provides researchers with new research possibilities (Varnali and Toker, 2010). Since this technique does not permit a precise categorization of each piece, numerous articles are mentioned multiple times. That is, in the following subsections, each group is further categorized and evaluated in depth.

MAJOR FINDINGS

The evaluation of the selected 17 papers shows the sparse research interest in-game AI and dispersed geographical, academic context by publication type, techniques, and subjects. Trends in demographics suggest an upward trend from 2019 onwards (Table 2). Furthermore, between 2018 and 2021, five research were published, indicating a significant increase in scholarly interest in the topic. However, game AI publications are from journals in diverse disciplines (Table 3), which precludes developing a coherent and generalizable perspective.

Maximum studies are from the USA (5), followed by China, UK, and Russia (2 each) and Denmark, Canada, and India (one each) (Table 1). Game AI research is geographically concentrated in few countries and lacks an integrated and universal research approach. Quantitative approaches are used in the majority of investigations, followed by qualitative analysis. Only one publication used mixed methodologies, demonstrating that methodological approaches are polarized (Table 4). Researchers in-game AI have primarily focused on the popular genres of first-person shooter (FPS) and real-time strategy (RTS) games, which use open-source game engines. Though these games provide information on complex opponent behaviors, there is limited analysis on the impact on the player's pleasure (i.e., the interest of the game).

SIMULATION AND AI

The papers were categorized (Table 5) under AI simulation (applications of intelligent creatures or entities with varying degrees of cognitive capacities), and AI for simulation comprising of two perspectives, i.e., Simulation with AI support (AI-assisted simulation and gaming infrastructure as a support facility which enhances cognitive abilities for computer assistance) and Simulations powered by AI (use of AI techniques for the generation of model behavior and associated machine learning to support knowledge bases used for behavior modeling).

Figure 1. Prisma 2009 flow model
Source: IGI, 2021
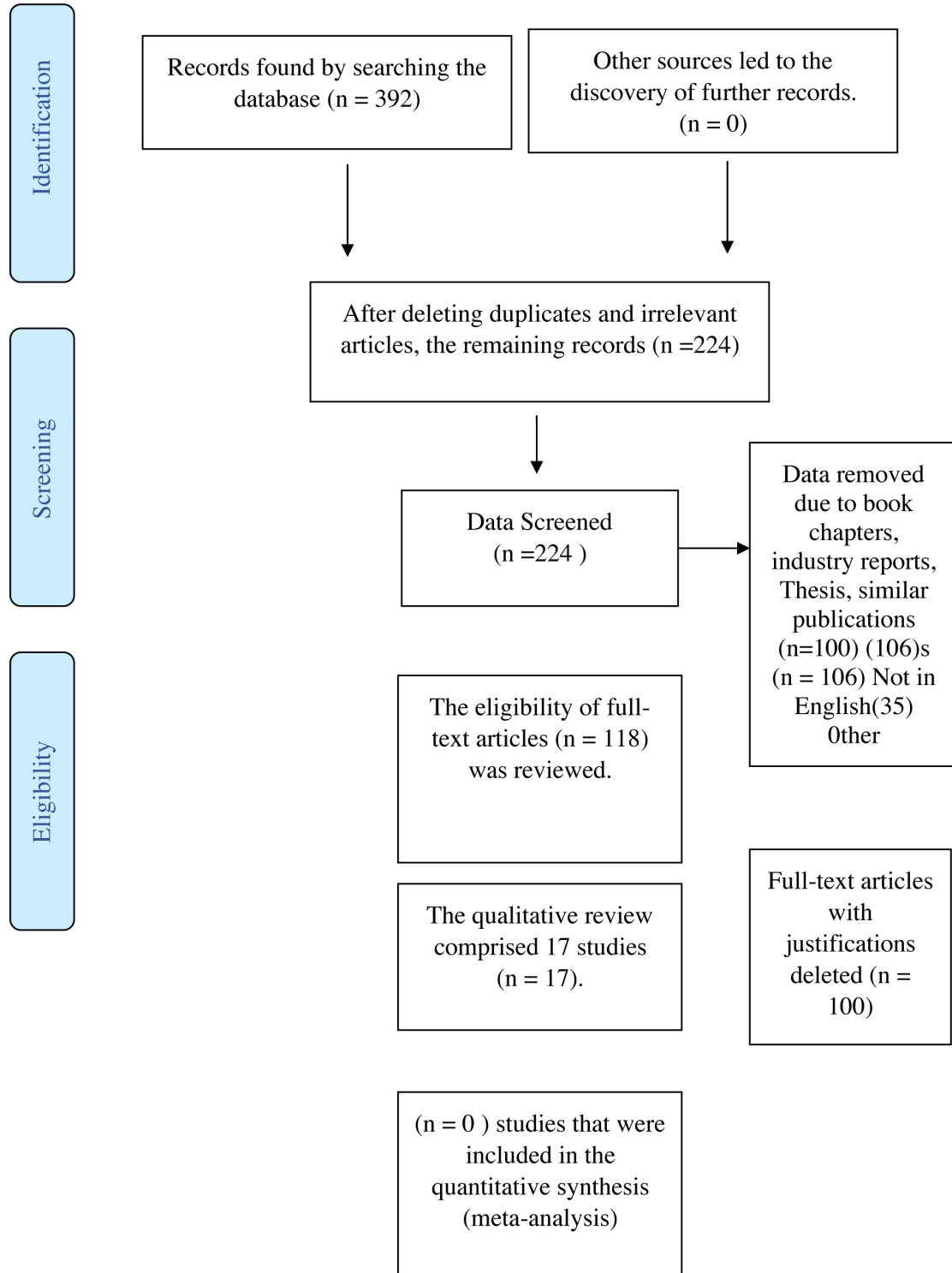
Table 1. Review of papers selected

Author	Categorization	Sample	Findings
M. O. Riedl, 2010	Computer Games	NA	The ability to create unique, customized experiences that consider individual players' tastes, styles, preferences, and capabilities has implications education and training applications through tailored and challenging computer games.
GN Yannakakis, 2006	Computer Games	30 Games	shows how various degrees of engagement generates high entertainment values. Finally, how the method might be applied to various genres of digital edutainment and entertainment is explored.
L Yilmaz. et, al., 2006	Gaming	40 Games	The goal of this article is to look into the interaction between software agents and simulations and games. Agents with sophisticated cognitive capacities and those embodying personality, emotion, and cultural elements of persons and communities, including difficulties, fall into this category.
N. Yannakakis, 2005	Games	50 Games	This study proposes a research strategy for producing NPCs that make enjoyable games that are diverse and complex, above research areas, and is backed up by multiple pilot tests on test-bed games.
S.C. Jacobsen. et, al, 2004	Humanoid robots and the Wearable Energetically Autonomous Robot (WEAR)-review	NA	This work aims to create power systems that can produce high-quality servo actuation for long periods without having to re-energize the system. On the other hand, we're collaborating with various groups to develop physical robots that can operate under the control of advanced AI-based systems.
B. Xia, 2020	Games-review paper	3 Application fields of games	In non-player character research, the study looks into credible agents, game level generation in procedural content, and player profile in player modelling.
G. N. Yannakakis and M. Maragoudakis, 2009	Games	274 Games	For the problematic case study of cognitive modeling in physical games, the results show the value of using neuro evolution and sequential forward selection.
Julian R. H. et, al, 2015	Mario Level Game	37 Participants	The experiment results imply that current computational measures should not evaluate content generated by computer programs instead of user research.
J. Bates, 2021	The novel, Cinema, and Television	NA	We consider this focus on the interface akin to studying celluloid rather than movies, paper rather than novels, cathode ray tubes rather than Television, and hardware rather than software. While the user interface is important, we also need to think about the fundamental structure of the environments we want to emulate. Traditional arts and media are excellent examples to consider.
G. Yannakakis and J. Hallam, 2007	Gaming	30 players	Researchers show that various levels of engagement create high levels of entertainment and projects the applicability of its approach to other genres of entertainment in digital medium.
M. A. Hossain. et, al, 2014	Health and Well Being Entertainment of Elderly Entertainment	Four male and four female subjects	The findings of the paper show that the proposed framework is viable. and that the proposed strategy demonstrates the need to develop services and entertainment systems for the senior citizens that enable them to enjoy independence, happiness, and live actively.
M. Certický. et, al, 2018	Electronic Entertainment	31 Participants	The findings show that cognitive measures can be used to gauge how much people appreciate digital entertainment.
W. Li and F. Ture, 2020	Voice-Activated Intelligent Entertainment System	351 Utterances	Paper presented an automatic annotation system that uses an unstructured approach to detect erroneous transcriptions and offer potential solutions.
Carole R. Beal. et, al, 2002	Games	NA	The capacity to continuously analyze the user, model their grasp of the game, and use this information to influence gameplay may likely make gaming more appealing to a much larger market.
Sylvia M, 2019	Media Sector-review art	149 Articles	Audience experience, content development, discovery, experience and engagement, content optimization, management, and development, insights, and operational automation are examples of media AI applications. However, balancing efficacy and efficiency, as well as human and AI judgment, poses substantial issues.

Table 1. Continued

Author	Categorization	Sample	Findings
J. Fleureau, et. al., 2012	Video Applications	10 Subjects	Without active calibrations or on-the-fly detection, the study was designed to be as close to real-life scenarios as possible. Furthermore, the influence of each physiological modality was evaluated utilizing consumer-friendly mono, multi, and extended multi-user scenarios.
G. N. Yannakakis and J. Hallam, 2007	Computer Games	50 Games	The methodology's potential was examined in different genres of games with multiple users where the complexity of the opponents' jobs differed. In addition, whether the concerned metric, online evolutionary learning mechanism, and the neuro-controller can be extended were evaluated

Source: IGI, 2021

Table 2. Country wise categorization

Country	Frequency
China	2
USA	5
UK	2
Denmark	1
Russia	2
Canada	1
India	1

Source: IGI, 2021

Table 3. Journal wise categorization

Journal Name	Frequency
International Wireless Communications and mobile computing	1
AAI Stanford Spring Symposium	1
IEEE Transactions on the system, man and cybernetics- Part A: system and humans,	1
Hellenic Conferences	1
Applied AI	1
International Journal of AI tools	1
The international journal of Robotics	1
Presence: Teleoperators and virtual entertainment	1
11th AAI conference on AI and Interactive Digital entertainment	1
Simulation and Gaming	1
Sensors	2
Computers in entertainment	1
Level up Digital Games research conference(Proceedings)	1
International journal of media management	1
Association for computing machinery	1

Source: IGI, 2021

Table 4. Year wise categorization

Year	Frequency
2002	1
2003	1
2004	1
2005	1
2006	2
2007	2
2009	1
2010	1
2012	1
2014	1
2015	1
2019	2
2020	2
2021	1

Source: IGI, 2021

Table 5.Categorization of papers by application

Simulation for AI	AI for Simulation
Carole, 2002; Yannakakis and Hallam, 2006; Yannakakis and Hallam, 2007; Yannakakis, Maragoudakis, and Hallam, 2009; Julian R. H. Mari~no and Willian M. P. Reis and Levi H. S. Lelis, 2015;	Bates, 2021; Yilmaz, Tuncer Ören;Nasser-Ghasem Aghaee, 2006; RIEDL, 2010; Martin Cˇ ertický 1, Michal Cˇ ertický 2, Peter Sincˇák, Gergely Magyar 1, Ján Vašcˇák, and Filippo Cavallo, 2019 ; Li and Ferhan Ture. 2020.;

Source: IGI, 2021

Currently, research concentration is on AI-supported and AI-Based modeling and simulation for enhanced game experience. Interface and knowledge on user experience and behavior have been researched more than intelligent entities and agents. However, research on cognitive modeling across human-computer interaction networks is emerging as a significant area of interest. Simulation for AI research has focused on modeling the user (player) engagement or pleasure level in real-time to generate insights on the proper AI technique Yannakakis, Maragoudakis, and Hallam, 2009). Use of fuzzy-NN and ANN evolutionary approaches to model whether opponent behaviors adds to the player's delight) for enhanced quality of player's experience so that digital environments can be adjusted according to user preferences is being actively researched.

In the realm of distributed artificial intelligence (DAI), the agent paradigm is emerging as a fundamental enabler for the usage of intelligent agents in the simulation. On the other hand, software agents are generally employed as design metaphors in the construction of simulation and gaming models and scenarios, which limits their ability to improve numerous other aspects of simulation. Moreover, the future applications of software agents in simulation by and supported by Agents - for improving cognitive capabilities in problem formulation and solving have not been thoroughly investigated and exploited.

APPLICATIONS OF GAME AI

Entertainment metrics and user modeling in computer games have been the primary focus of Gaming AI research (Table 6). In contrast, real-time emotional flow and online adaptive learning have not received adequate attention. Entertainment is a multifaceted mental delusion influenced by the player, the game, and a variety of other factors. Researchers admit that defining a quantitative criterion for amusement is probably prohibitive, and a numerical value by which games can be ordered similar to players' judgment of entertainment is considered sufficient for the purpose.

Raw data collected from gameplay, such as aspects of the challenge, curiosity, fantasy, and so on, and expressed preferences or rankings by players between instances of gameplay are used in the majority of ways for generating quantitative metrics for evaluating entertainment. Raw data are the observables for constructing metrics, but expressed preferences define the degree of unity of any metric function proposal with human judgment. However, this is predicated on the premise that opponents' behavior is the fundamental determinant of a game's entertainment value. Intelligent Tutoring Systems for online adaptive learning has not been adequately researched as it may also have applications for edutainment (education + entertainment).

Table 6. Scheme for Creating Digital Entertainment

Entertainment Metrics	Online Adaptive Learning	User Modeling in Computer Games	Real-Time Emotional Flow
Julian R. H. Mari˜no and Willian M. P. Reis and Levi H. S. Lelis 2015; Yannakakis and Hallam, 2006; Yannakakis and Hallam, 2007; Yannakakis, Maragoudakis, and Hallam, 2009; Julian R. H. Mari˜no and Willian M. P. Reis and Levi H. S. Lelis, 2015.	Demasi and de O. Cruz, 2002; Johnson, 2004; Ponsen and Spronck, 2004; Stanley et al., 2005.	Houlette's (2004); Charles' and Black's (2004); Bates, 2021; Martin Cˇ ertický, Michal Cˇ ertický, Peter Sincˇák, Gergely Magyar, Ján Vašcˇák and Filippo Cavallo, 2019.	Riedl, 2010

Source: IGI, 2021

SCOPE OF AL APPLICATIONS

AI consists of various cognitive technologies including machine learning and physical robots. Machine learning (ML) is a data mining technique that allows machines to understand and improve their experiences in the same way that humans are capable of by feeding them data. A deep learning neural network, a computer model, is trained to use data with multiple layers and neural network topologies to perform classification tasks from text, images, or voice. The rules-based system can use knowledge databases and automate processes by using rules of developing information inferences. Natural language processor (NLP) allows a computer algorithmic program to make sense and meaning of human language and intent from humans to engage with them in a grammatically and stylistically correct manner (NLP).

The field of computer vision is focused with obtaining and interpreting meaningful information from visual aspects automatically. On the other hand, speech recognition is a fantastic notion that deals with the speech detection and reproduction of human language. Robotic process automation (RPA) is a process

199

in which ordinary laws business operations are automated. As a result, businesses can focus on value added work (Boulton, 2018). RPA is frequently used in conjunction with NLP, ML and speech recognition to automate judgment –based and perceptual processes. As a result, humans are can work tasks of higher complexity. Finally, robots are physical manifestations of machines that accomplish jobs in any environment, including uncertain ones, while providing support in human interactions (Brynjolfsson & Mcafee, 2017; Duan, Edwards, & Dwivedi, 2019).

The review shows that research in "Game AI" is predominantly focused on "ML and Deep Learning neural networks" to enhance the user experience through interaction with software agents and on "entertainment metrics" to evaluate the effect of the gaming experience on human (user) emotions and satisfaction. The focus of entertainment metrics is shifting from qualitative to quantitative measures, emphasizing the measurement of features of visual and interactive experiences that generate enjoyment and satisfaction for humans. However, there is almost negligible research on robotic process automation (RPA) combined with voice recognition, NLP, and ML to automate perceptual and decision in game development.

CONCLUSION

Research in Gaming AI is fragmented and unrelated as regards geographical, methodological, and disciplinary aspects. Gaming AI is an emerging research area gaining interest in recent years though very little quantitative or qualitative research has been undertaken to date. The focus of research has been predominantly on the effect of user interface and user knowledge on her experience and behavior compared to the impact on intelligent entities and agents. However, research on cognitive modeling within human-computer interaction networks is emerging as a significant field of interest.

The agent paradigm has primarily been used as a design analogy in the growth of computation and playing games models and scenarios. However, the potential applications of computer programs in Agent simulation, and Assistant simulation for improving cognitive capabilities have not been adequately researched. Though "entertainment" is a complicated mental experience that depends on the player, the game, and other external factors, the focus of research on entertainment measures is shifting from qualitative to quantitative. Researchers admit that defining a quantitative criterion for entertainment is likely impossible. Thus a numerical value by which games can be sorted like players' perceptions of entertainment is thought to suffice.

IMPLICATIONS

Findings from entertainment modeling research can enhance users' experience, and game developers can incorporate research findings by focusing on attributes and features that enhance the "fun" and "fantasy" experienced by users. Because human and artificial intelligence networks co-evolve, and challenging and complex tasks can be accomplished by combining human intelligence and AI, hybrid intelligence techniques can deliver better results for game development than those achieved by human and artificial intelligence networks working independently. For example, in in-game creation, AI can use psychophysiological indicators to simulate the player experience.

Agent and Agent-based simulation provide possibilities for enhancing the cognitive capabilities for problem-solving and advanced game development. Agent-based simulation, which employs agent technology to develop or monitor model behaviour, can assist complex experiments and deliberative knowledge processing, such as planning, determining, and reasoning. The review provides direction for developing a unified and integrated model for Agent-directed simulation and Gaming AI. In addition, identifying research gaps and factors that need research attention can lead to a cohesive perspective for theory development in Gaming AI.

LIMITATIONS

Other applications of Game AI, such as supporting game design and production, game analysis, and so on, are beyond the scope of this review. Research is Gaming AI is restricted by the genre and number of games being researched. Though hybrid intelligence and cerebral control gaining are becoming more popular, they have yet to be implemented significantly in gaming AI research.

FUTURE RESEARCH DIRECTIONS

One of the biggest challenges for game producers is creating human-like bots because it's impossible to define what "human-like intellect" means for a bot in a videogame. The backdrop of a psychological setting adds complexity, particularly in General Game Playing (GGP), and future research could focus on whether a bot can play diverse games without previous training? How to make a generic game that is automated A possible area that remains relatively untapped is players that resemble a human and understand the laws of a game and play without prior instruction.

Future Research Directions in Game AI Applications

Research which includes modeling of players, AI-assisted game, PCG, NPC's, procedural content generation, active computing, evaluation of player level of satisfaction, and the generation of decision making behaviors or strategies for non-playable characters (NPC), has a lot of potential as very few studies exist in literature which precludes the development of an integrated and generalizable framework for practitioners (developers) and players (users).

Most commercial and academic research in "Gaming AI" is woefully inadequate, particularly in providing qualitative methods for assessing a game's entertainment quality and implementing innovative Ai technologies to create entertainment for the user automatically. Game development has emphasized the graphical portrayal of the world of games, with little attention paid to the behavior of non-player characters (NPCs). NPCs are still controlled by programming rules and limited or blurry machines in most games (Woodcock, 2001). Humans (users) seek more intelligent opponents and richer interactivity as the number of inter games online (among other things) grows, which can be provided by generative brilliant interactive characters (Funge, 2004) and by creating more feasible, demanding, and impactful fun (Fogel et al., 2006).

It's still unclear which aspects of a game contribute to its players' enjoyment and satisfaction and how to create enjoyable game computational metrics. Researchers can concentrate their efforts on de-

termining how to effectively quantify joy by measuring qualities that are difficult to measure in user research. For example, future research could be determined by measuring psychophysiological signs like electro dermal activity or respiratory activity or evaluating the player experience through expressions and electro dermal movement.

The present computational metrics cannot replace a well-designed user study. On the other hand, computational metrics can be utilized during the design phase for fast and easy exploring analyses of the PCG system, which could be a future study emphasis.

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Chapter 14

Employee Wellness Without Stress and Strain:
Application of Yoga and Meditation in Management With an Industry 5.0 Perspective

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ABSTRACT

Amidst the COVID-19 pandemic situation, the human race has entered the era of hope and transformation, and there is growing pressure and focus to raise awareness to adopt alternative interventions and sustainable practices to ensure gaining sound functioning of physiological organs. Can yoga and meditation promote clarity in thoughts and enhance alertness at work? Does practice of mudras help in improving concentration level of individuals? Do yoga and meditation help to improve the improve quality of life in general? The aim of this chapter is to help new practitioners, scholars, and employees to understand fitness mantra without stress and strain through Indian style of yoga and meditation. This chapter presents an overview of collection of research papers and articles written by yoga experts, saints, and researchers that have emphasized psychology, spirituality, and mentioned evidence for better mental health or effectiveness of yoga, meditation, and mudra interventions as tools for improving the overall personality and mental health of individuals.

INTRODUCTION

Yoga as an ancient practice being followed globally by all walks of people for improving their physical, emotional, mental, and spiritual state (Rakhshani T.,2014). Recent studies show that skills for improving quality of life with yoga training provide positive emotions associated with well-being of an individual (Karmarkar, K., et al 2017). According to (Group T.W., 1998) quality of life may be defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. However more studies are needed to explain this relationship and to determine which facets may correlate and mediate the yoga-quality of life relationship. Yoga is not the just workout or body building and muscles developing way but is much more than this it is essentially done to bring synchronization in the body, mind, breath, and spirit. it is a type of lifestyle. Yoga makes the body flexible and promotes relaxation in the most stressful moments. Combination of yogasanas, pranayama, and meditation makes a compete Yoga module. An organization with stressed workers cannot bring prosperity and its survival may also become difficult and doubtful over a period of time(Ganster, D. C.,etal.,1991)

For many years, psychiatrist scientists have affirmed that prolonged stress at the work place leads to various mental health complications. Corporate sector have taken initiation to adopt alternative interventions and sustainable practices to ensure to sound physical and mental health of their employees who cannot overcome the workplace stress by self-help strategies. Today most of the corporate sector employees are constantly running in a race of business competition without a celerity of goal. This is also leaving most of the employees in a constant state of dissatisfaction and distress therefore, the only way out to lead a stress-free life is to upgrade one's personal software to keep up in this race of improving oneself till death. Yoga is one of the ancient effective & efficient therapeutic method to achieve wellness and to treat different mental and health related issues. This study is an attempt to evaluate the wellness of the employees of corporate sector by an appropriate systematic review design on yoga asana and meditation(Valle, D., et al., 2020)Further this research will also provide solution to the corporate world to manage wellness of their employees at workplace by introducing practice of mindfulness and stress-reducing exercises. This study also investigates to what extent yoga, as a collective activity promotes physical, mental, and psychological awareness, benefits the individual members of the organization as well as employer–employee relationships in the organization.

Objective of the Research

- To review the ancient Indian Vedic practices of yoga and meditation and in improving the quality of life of employees.
- This research to provide solution to the corporate world to manage individual's wellness by introducing practice of Yoga and meditation as stress-reducing exercises at workplace.
- This study is an attempt to evaluate the wellness of the employees of corporate sector by an appropriate systematic review design.

Value Addition in Knowledge by this Manuscript on Employee's Wellness

Well-being of employees is carefully connected with fitness and productivity. Research indicates that personnel who are in optimal bodily, intellectual, and emotional fitness are much more likely to deliver all round best performance at work place than the personnel who are comparatively less fit or not fit. Healthy and satisfied personnel are tested to have higher quality of life, a decrease risk of any disease, less injury, higher productivity output also have extra probability for contribution towards their co-workers with poorer health and serve the community. This is the reason that National Academy of Medicine and the Occupational Safety and Health Administration have recognized employee health as a nationally essential fitness issue.

Workplace situations can have an ill effect or a positive effect on physical, intellectual, or emotional degree of any personnel. In the various studies it is observed that problems like obesity and cardiovascular disease blood pressure or cholesterol problem develops due to prevalent occupational condition with lack physical activity and poor diet plan of employees. Work surroundings also can impact the employees mental & intellectual fitness and work pressure or stress levels. Work-associated elements which have an effect on employees wellbeing and health depends upon job demand and work load, degree of independence and flexibility for decision making, level of interactions with supervisors and co-workers, frequency of shifts, and total time period of a working day and overtime work. During Covid 19 pandemic meditation and yogic breathing technique showed significant positive impact on the well-being of healthcare professionals (Divya, K., et al., 2021).

Proposed Study Selection and Methodology Used

The methodology used was extensive literature review with the objective to understand the different approaches for wellness from illness. The methodology adopted was desk research. Various sources like online journals, books and online research were studied and analysed for preparing existing research paper. To prepare sound comprehensive review from the present research literature with respect to the effectiveness of different yoga practice along with Meditation and Pranayama practice delivered in corporate sectors is considered. Reference from bibliographies of relevant articles was taken and examined. Keywords were used to identify articles were mainly yoga, meditation, work place employees quality of life and wellness. Articles were obtained are from mixed databases like Psychology, Behavioral Sciences, Management, HR Practice and Health Watch. Full text articles were taken.

(As per Figure1.) To obtain high level of evidence, inclusion criteria for the review of the study was limited to Yoga interventions at workplace, randomized and non-randomized study design as intervention of Yoga vs. control group stress as a dependent variable of the study was considered besides this any other form of yoga intervention is also considered like physical or physiological variables and quality of life variables has also been considered for qualitative analysis. Research Articles identified through different data base n=175 Articles removed after title and abstract screening n=70. Full articles assessed eligible after abstract screening n=105. Text excluded n=93 for following reasons - no yoga as intervention, no stress assessed as outcome, no workplace setting, no meditation, no highlights of Mudra, no quantitative data reported. Review study from 12 research paper is selected for qualitative analysis of systematic analysis

Figure 1. Selection of proposed study
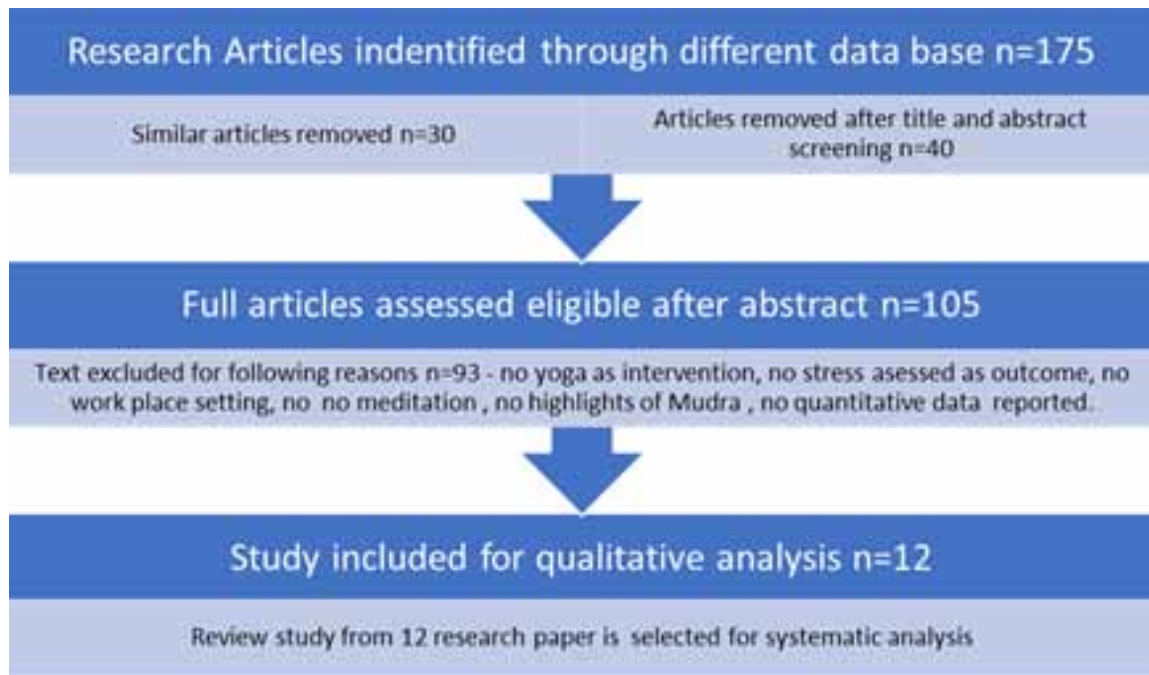
Influence of Yoga as Self Help to Resolve Emotional Dissonance of Employees

Whenever there is lack of agreement in similarity of emotions between office environment and its employees this situation leads to Emotional Dissonance. In previous research it has been observed that Emotional Dissonance is the root cause of Stress (Tewksbury Higgins, 2006),

Yoga is one of the techniques to reduce emotional dissonance and to improve personal well-being of employees and also to enhance the productivity of an organization. Personal and Psychological deterrents like anxiety, stress, depression is the root cause which has prevented employees from giving their 100 percent in their job and has prevented human race from growing and flourishing (Subhash C. Kundu, 2017). Today, both employers and employee are showing their quality of being inventive by adopting various techniques for mental well-being and are contributing their bit towards society (Iyer, T.,2019). This is evident from the Figure2.

(As per Figure 2), Under Self-Help Strategies the relaxation techniques the most popular are muscle relaxation, yoga, deep breathing, meditation. The practice of relaxation strategies on daily basis is extremely beneficial as it helps to reduce the impact of stress or distress. The Physical Activity Reduces Stress and also brings the focus to the body from mind hence is an extremely beneficial self-help measure because it not only deviates attention from stress or but also ensure both physical and mental well-being (Iyar, T.,2019).

Figure 2. Tabular structure of efforts and initiatives taken for mental well-being of employee's

Initiative taken by Employers	Initiative taken by Employees themselves	Initiative taken by Society
Conducting workshops on muscle relaxation techniques like Yoga	Use of Books on self help	Multiple self helps and self-care apps like
Gym facility	Usage of mindfulness meditation techniques	Gratitude journal , gives tips on Gratitude . Labs LLC. gratitude.co.in
Permission for Flexi timing	Indulgence in leisure activities	Sunrise inspiration for postive thoughts through quotes qoutes , Simple truth.com
Availability of Counsellors	Talking to friend counsellors and family	Happify suggests happiness boosting things Happify Inc.
Payed Holidays	Exercising Yoga	
On line message board		

Influence of Yoga on Quality of Life

The previous studies have shown significant association of Meditation, Yoga and QoL (Kinkhabwala, D., & Bhavesh, A. 2020). Can meditation practices be elevated, for the higher level of consciousness by taking help of artificial intelligence? Yoga practice positively influences the practitioner towards spiritual realization interpersonal relationship, social inter-relation and personal behavioral transformation they are the common traits of quality of life. As per (Bindlish. P, et al., 2011) the imbalance in lifestyle causes stress and damages overall health of human life. The dynamic changes in the environment and social factors at the workplace increases the pressure to cope up and strive to regain balance to elevate psychological health of employees. The western kind of lifestyle at workplace where employees are under high work pressure to meet the targets in the competitive market can be balanced with the eastern broadcast of hatha yoga which helps to influence quality of life along with total quality management at workplace (Dalal. R., 2010). Quality of Life is perception of life with context to value system, culture, expecting goals to achieve with a standard and concerns in an individual life (WHOQOL User Manual, 1998). Quality of Life is also explained as wellbeing of an individual with subjective aspect (Preedy, V. R., et al., 2010). The psychological and physical health condition of an individual that satisfying requisite level of standard of living is another way to perceive quality of life is well explained by (Feuerstein., 2008). Please refer annex for more details and related contents.

Mudrā Science

Hands fingers are capable to do some extra ordinary things besides assisting in holding, eating, and doing physical work. Hands are the instrument to everything. They are like the control panel to everything. In science of yoga and meditation there are hundreds of Mudrās, some are used for health, some for wellbeing, some Mudrās are done for creating processes. In fact, different features of life can be denoted with the Mudrās. For example, in yoga a particular asana has a unique Mudrā, and a specific kind of breathing another Mudrā is useful, to derive the best result from within the human body (Sadh guru J., 2015).

As per figure 4, the Mudrā relate to Yogic Sciences and are very easy to perform. They have no side effects. These Mudrās can be practiced in any easy position (Kabat-Zinn J., 1998). For those who wish to go beyond the physical health benefits and calming effects of meditation, may go for higher stage of meditation with the practice of yoga Mudrā. There are 24 Mudrā associated with each word of the Gayatri Mantra, if performed in a correct way it can help to transform an ordinary man to a superhuman being. The mudrās can be performed simply while meditating in a lotus position or seated in a straight-backed chair. Before each Mudrā session washing of hands is mandatory then rub both the hands each other for 5-7 times, then hold the hands before the Navel this helps to flow energy in the hands. To perform Dhyana Mudrā, place both hands like bowls in your lap, with the left hand on top and two thumb-tips touching. Please refer below figures 1 to 10 for detailed description of Mudrās (Sharma, SR.,1995).

In Hinduism a spiritual gesture performed by the fingers and hands are called mudrā it represents seal of energy of the body. mu:ˈdra means seal, mark, or gesture (Chadha, M A., 2015) Since ancient times in Indian religions and traditions, Mudrās are being practiced spiritually to assist in meditation and /or healing. There are many types of Mudrā which can be performed with the hands and fingers. In an Indian dance form, sculpture and painting iconography (Buddha) variety of Mudrās are portrayed (Gothe, N., 2016).

In yoga, different gestures of fingers and hand (mudrās) are used in conjunction with pranayama (the yogic breathing exercises) and are generally done while seated in the pose of Padmasana or Vajrasana. Each mudrās formations stimulate and activates different organs and body parts. Mudrās when done with breathing exercise it affects the flow of energy and also helps to change the mood of an individual. Each hand gestures and its positions during Mudrā act as locks it guide energy flows and reflexes to the brain (Pandya P., 2020) .During Mudrā making crossing, curling, pressing, stretching or touching thumb with different fingers of the hand we can help to manipulate the mind body. Mudrās allows a physical connection with an intangible wish this is possible because each area of the hand corresponds to a certain part of the mind or body. There are different mudrās formation however by meditating on a specific Mudrā helps manifest certain hopes, energies, or devotions into your life (Ojha H., et al, 2016).

At a higher spiritual level, practicing on specific mudrās shows the outward representation of one's inward intentions. Mudrās show what a practitioners' desires and what he intends to be! (Monk-Turner E., et al, 2010). Please refer annex for more details and related contents.

Figure 3. Different Mudrā formation
Source: https://www.google.com/url?sa=i&url=https%3A%2F%2Fpurelifeplanet.com%2Fblogs%2Flifeblog%2Fmudra

Yoga Induced Effects

Yoga and Meditation are the ancient Indian technique given to the world by Maharishi Patanjali around 2500 years back. The purpose was to keep physical, mental and spiritual body perfect and happy (Pandurangi, et al, 2017). Yoga makes a person fit, alert attentive and help to maintain balance between stressful work pressure and mental, emotional social and physical life. (Godrej F., 2016).

21 Century yoga may be the deciding factor for emerging world power and will also help to change most of the events to re-establish a new world characterized with purity, peace and prosperity (Modi N.,2020).Yoga asana helps to lay the foundation to build physical endurance for achieving self-control the third branch of the eight-fold path of yoga (Halpern J., (2011). In Yoga one dips into the peaceful silence to flow towards union of mindfulness (Iyengar., 2014). There are as many as 84 yoga asanas which give impact to different muscles of the body. These asanas are to be performed in different postures like, standing, sitting postures, bends backward, forward, twists, inversions, and restorative asanas. Each posture is beneficial for physiological organs also positivity at psychological level (Svatmarama., 1992). It is rightly stated that, health is wealth, but only sick person realizes this! Good health is a state of complete physical, mental, social, and spiritual well-being of a person and not merely the absence of disease or infirmity (Nieman., et al, 1986). God has created human beings as the most valuable and matchless creation on planet earth, however the crux of this creation is to keep the human life safe, happy, and healthy so as to explore and attain the highest achievement on earth. Please refer annex for more details and related contents.

(As per Figure 4) in the modern world of today, there are innumerable new medicines which are discovered only with the objective to safe human body from illness and diseases (Bhavanani., 2017). One who practices Yoga are called Yogis, they learn to derive spontaneous joy and deep satisfaction by living their lives simply and, not from gaining riches. From Yoga practice one can develop skills of high order and overcome big challenges of great complexity by becoming part of the evolutionary process.

Meditation for Personality and Spiritual Growth

The primary purpose of meditation practice is to facilitate awakened spiritual consciousness (Srinivsan, N., et al, 2014). The benefits which contribute to our well-being and improved functioning are several few as cited by various practitioners in the text are given below:

1. Meditation helps in mental transformations and thinking processes become more organized as the result of meditative calmness and the influence of refined states of consciousness (Thera, N., 1996).
2. Practice of meditation boosts the immune system, physiological functions organs are strengthened and encouraged to be more balanced and efficient (Tanner, M A., et al., 2009).
3. Meditation enables to slow down the biological ageing processes. The meditators are mentally and physically younger than their calendar years' age (Sadh guru J.,2015).
4. With the practice of meditation, stress symptoms are reduced. The nervous system is refreshed and enlivened, allowing awareness to be more easily processed through it. (Pradhan S., 2016).
5. Regenerative energies are awakened with meditation they are directed by innate intelligence, vitalize the body, empower the mind, and have restorative and healing influences. (Sharma, S.R, 1995).

210

Figure 4. Tabular structure of comparative analysis between yoga-induced effects and drug induced effect
Source: Book -Yoga without Sweat and Strain, authored by R.K. Paliwal

Sr.No.	Drug-induced effects	Yoga-induced effects
1	Altered state of awareness (low awareness of self and environment)	Betters awareness of the self. In fact improved awareness is the mission of yoga
2	Sedates you to sleep by dulling the intellectual edge sphere	Better control over sleep pattern
3	Responses are altered in every sphere	Response is controlled and one learns to manage reactions
4	Sleep pattern – irregular, erratic and disorganised	Sleep pattern becomes regular
5	All interdependent functions become disturbed and erratic	All interdependent functions are better
6	Remains constipated with disturbed digestion	Digestive function is normalised
7	Poor lung function	Improved lung function
8	Memory is poor. At times even total loss – blackout etc. possible	'Long-term' cognition is better. Mindset fluctuations do not vanish, but are manageable. Not a prey to mindset variations
9	Tends to be hasty in decisions; poor judgement and decision making; falls prey to emotive compulsions; capacity to withstand stress is poor	Not hasty. Balanced decision making, good judgement; no emotional slavery; takes a practical view of situations; copes with stress effectively
10	Tends to become a 'loner' and further makes things difficult for the family	Does not get cornered or thrown out or singled out; does not remain a 'loner'. Even when alone, does not get depressed
11	Concern for others and for self is poor; very irresponsible	Concern for life is primarily for others and for a self-responsible attitude towards life
12	Life defying methods adopted; too many secondary problems require to be attended. Health is in doldrums, injuries are very frequent and if untreated even need for amputation may arise; simple goals of life are not set, positive goals do not exist	Lives well and long; secondary health problems reduce; becomes more careful and caring; accidents reduce. Lives quality life, health adhered to; sets goals and achieves them
13	Suspicion increases	Suspicion does not vanish but reduces, starts listening to others' viewpoint; is more unbiased, flexible and open-minded
14	Has a lot of difficulty in situations. Unable to play the roles of life which are varying, becomes secretive beyond normal limits – becomes a vault and does not open up	Roles of life played with greater ease; opens up – is ready for giving and seeking help. No major stumbling blocks as regards seeking help.
15	Mental and challenging attitude is affected	Accepts mistakes. Does not challenge when provoked
16	Becomes too moody. Moods and their fluctuations are a pain for family members	Mood swings reduce and do not pose problems to family or work environment
17	Avoids work, postpones Changes jobs too fast – inconsistency at work	Treats work as worship Consistent and punctual at work
18	Abuse of drugs and poor value system	Does not abuse drugs. Quality and value system is better
19	Reduced wisdom in day-to-day life, instincts becomes uncontrolled – animal instincts predominate. Control is poor	Wisdom builds up; respectability and values are followed and adhered; open to reason. All demands of life have human touch of 'love and care'; gentle behaviour
20	Invites death at each turn of life; invites ill will for relatives and neighbours	Does not invite death; game of life and death is a reality. Learns to live with peace and end is not abrupt. Ill will and hatred is less, learns to forgive and forget. An asset to society at large

211

LITERATURE REVIEW

The extensive review of literature is done in the direction of the research problem, highlighting the experiential finding from the different methodology and investigations from recent to past to make a relevant significance in the current research area.

Artificial Intelligence is helping employees to become stress-free during the Covid-pandemic situations (Arora, N., et al.,2020)

Artificial intelligence (AI) has remodelled our lifestyle by imitating human intelligence with the help personal computer by fixing numerous issues. Previously AI was used for designing victory in chess game, language recognition, photo retrieval etc.. With the technological advancements, AI has been upgraded as a sophisticated tool with decrease price, rapid and efficient performance in fixing complicated issues (Dananjayan, S., et al., 2020).

AI in healthcare has proved to be better than conventional analytics and scientific decision-making strategies. Machine Learning algorithms, a subset of AI, can notice different styles from massive, complicated datasets to make it an error free and accurate dataset, this process permits people to have advantage with unparallel insights at a very early detection stage of ailment, sicknesses, drug discovery, diagnostics, healthcare processes, remedy variability, and affected person outcomes (Avadhuta, A. S.,2020).

According to (Java, S., et al., 2021) The capacity to check the effectiveness and technique to address the intense situation of AI algorithms is being done during outbreak of any disease or pandemic. The primary elements affecting AI algorithms are real-time information, historical data and excessive computational power. The very important role performed by AI all through pandemics are early caution and alerts, prediction and detection of outbreak of sicknesses, real-time disorder tracking worldwide, evaluation and visualisation of spreading trends, prediction of contamination fee and contamination trend, speedy decision-making to become aware of the powerful treatments, examine and evaluation of the pathogens, and drug discovery. All these are completed at a greater velocity with AI.

World health Organization Geneva, monitor and issues health guidelines based on the information received for various ailments and outbreak of diseases happening all over the world. With updated front-line computer setup and internet services, the information retrieved in real-time from institutions s promptly used to prepare a self-reliant, collaborative and an autonomous AI version to address numerous tasks. In addition AI can collect records from information outlets, forums, healthcare reports, tour information, social media posts, and others in more than one languages accross world over with the aid of using natural language processing (NLP) method and also flag the priority for each domain .

Some sizeable examples of Artificial Intelligence which can be used to fight the COVID-19 pandemic and others similar situation are as follows:

- AI may be used to get early information with a caution for outbreak of pandemic
- Blue Dot, an AI algorithm correctly detected the outbreak of Zika virus in Florida USA and noticed COVID-19 earlier than the WHO launched its assertion alerting human beings to the emergence of a unique coronavirus.
- In Wuhan, China, an AI diagnostic device is used to differentiate COVID-19 from different kinds of virus of pneumonia in few seconds by analysing chest CT scan test images of the patients. The authors claimed that their new version holds brilliant capacity to alleviate the stress of frontline radiologists, enhance early diagnosis, isolation and remedy, this has been a big contributions to the manager of the epidemic.

212

- Several computer based AI- imaginative and prescient digital digicam structures helps to scan the crowd for COVID 19 signs and symptoms and screen human beings during lockdown period (Bragazzi, N. L.,et al., 2020).

As per the published article on www.the hindu.com October 08, 2020 (Ramasubramanian, 2020), survey run by Oracle on a technology company with 12,000 participants, covering managers, staff, HR professionals across 11 countries, including the U.S., India, France, Italy and Germany. showed three fourth percent of the employees felt that artificial intelligence (AI) has helped to improve their mental health and wellbeing by providing information on the job, mass adoption of virtual collaboration with video-conferencing tools for daily routines of workplace. More than 80% people believe that robots & chatbots can support mental health better than humans because they can provide quick and unbiased help to employees.

Yoga in the form of laughter helps improves positive mood, decreases negative mood, and enhances happiness in all age of people, laughter yoga has great potential to lower the blood pressure. Incorporated into lifestyle programs (Andrianov, A., et al., 2020) (Ross, A.et al.,2014). Research findings show that Yog Nidra is one of the effective strategies for self-improvements along with significant effect on psychological variables like stress, anxiety, and depression (Ferreira-Vorkapic, C., et al., 2018). In one of the investigational studies conducted by author Ellis and team on six weekly Laughter Yoga program for aged people with average age 84 years for 30 minutes. The authors himself played the role of the trainer as laughter therapist. The participants were instructed to sit in a position so that they in eye contact with each other, next they did 10 minutes of breathing and stretching exercises like gentle neck and shoulder movements, and smiling to loosen their face muscles followed by fifteen minutes of Laughter Yoga, which consisted of chanting ho, ho, ho, ha, ha, ha with tapping body and laugh they tapped five times from the shoulder to the wrist and down on both the legs both left and right side. The progress of chanting becomes quicker with variety of smiles deep breading and laughs (Java, S., et al., 2021). To measure happiness, general happiness scale was used and to measure the mood, positive and negative affect schedule was used by the authors. A pre- and post-design was used to measure positive and negative affect, happiness and other physiological variables like blood pressure. This result showed that laughter yoga helped in improvement of mood and in lowering the blood pressure of very old people (Ellis, J. M. et al., 2017).

In 1950-1960 Abraham Maslow, famous psychologist, concluded in his study that, peak performance of an individual is characterized by moments of intense well-being and joy. The obstacles which seemed impossible in ordinary life are overcome with ease and grace. The subjects feel calm and in tune with eternal life and they effortlessly exceed their known skills and. competencies. Maslow found this to be extremely therapeutic (IvtzanI., et al, 2014). As per Maslow's hierarchy of needs is a motivational theory in psychology, idea of basic human need is physiology, safety, love, esteem, and self-actualization can help explain how a group, organization, or society can benefit from improvement in individual members' physical and mental health. Maslow further states that "a healthy man is primarily motivated by his needs to develop and actualize his fullest potentialities and capacities".

The challenges faced by the affluent segments of societies tend to reduce with increasing levels of affluence and to that extent 'flow' tends to reduce in spite of higher levels of skill enjoyed by this segment of society. According to (Gupta, R., et al., 2016) development tends to rob people of challenges and personal relationships which are crucial factors in promoting happiness in day-to-day living. This

has been established in the recent (2020) World Happiness Survey carried out by scholars of the London School of Economics (LSE). It has exploded the myth that wealth is the source of happiness. London School of Economics (LSE) research team states that one of the paradoxes of happiness amidst poverty is that even a little increase in income results in tangible improvement in lifestyle. Affluence tends to rob people of love and company and tends to sow the seeds of discontentment.

The essence of the Holy Bhagavad Gita teaches human beings, to act but don't be attached to the fruits of action whatever the outcome of action may be, good or bad, it should not matter (Bajaj., et al., 2016). Drop the selfish goals to achieve greater levels of performance. Work on the realistic goal and have a commitment towards it. The experience of bliss and lasting happiness can be achieved through karma which is devoid of rewards (Lykins E., 2014). While engaged in any activity forget everything else, be so much focused, that the work becomes a great meditation. When work is transformed into meditation excellence is achieved! (Bishop S., et al., 2004).

This secret of spontaneous effortless flow of performance in any area results in achieving peak of targets whether it is in academic performance, winning sports, running industry with huge economic turn over or maintaining a healthy body (Bhavanani A., 2017). All the variables line up for a picture-perfect performance, as if the finger of God has reached down and touched the high achievers. The doer merges in his task, the thinker into his thoughts, the artist with his art, the actor with his acting. A soft but strong feeling of blissful evenness is present most of the time in both the mind and body. Physically, it is experienced as an extremely delightful liveliness throughout the body (Aubrey A., 2007).

Mental preparation based on yogic techniques gives an extra edge in the outcome of work done (Deb S., et al., 2015). Yoga with emphasis on concentration, endurance and strength guarantees peak performance whether training for competition or one's enjoyment of the sport. Today, yoga is widely looked upon as a great healer for many of the present-day medical problems. illness, including major employees' work stress (Ferreira VC., et al., 2018).

The psychology of happiness is a state of mind in which attention is totally concentrated (Karmarkar K., et al, 2017). The intangibility of such a state is also explained by other researchers, who studied and investigated yoga and meditation. Meditation and Yoga are thoroughly structured exercise which triggers 'smooth flow of the task'. Meditation stills the thinking process, and one experiences effortless expansion, frictionless creativity in the ordinary waking stages (Bajaj B., 2016). The Painters, writers, musicians, or chess players can be so absorbed in their creative efforts that for them time is completely distorted – in fact, time ceases to exist for them. The same exalted state of being can be experienced by engineers, doctors, scientists, soldiers, athletes, rock, and mountain climbers and even by technicians working in a factory (Gupta S., et al, 2016).

Top corporates of India and European countries are taking recourse to Yoga for spiritual awakening programmes to withstand stress and the complexities of the corporate world and high-pressure jobs (Dwivedi U., et al, 2015).

Author team (Karimi, L., et al.,2019) investigated the impact of meditation on mindfulness, emotional intelligence, job satisfaction, and job stress-related presenteeism in an Australian workplace. Participants were taught 'Auto Transcending Meditation Technique' in their office. Comparison was done between an intervention group with a control group. The authors used descriptive statistics to measures pre-post intervention differences. The results showed significant improvements in their levels of mindfulness and emotional intelligence. Authors have recommended that workplace meditation should be considered in health promoting work settings.

(Ross, A., et al., 2014) in a large cross-sectional survey of yoga practitioners (N = 1,067) and examined 171 yoga practitioners on social benefits of yoga practice on four different domains like personal transformation with yoga, Yoga helps in social activity, loneliness and loss can be overcome with Yoga, spiritual perfection of self can be achieved with Yoga . With the help of two separate investigators themes were validated and confirmed from the text of the ancient Yoga Sutras of Patanjali.

Review Research demonstrates that yoga programs may improve concentration, stress management, social and intellectual functioning at the work place the protocol studied are displayed in Figure 5. The common observation was that there was an interest developed for relaxation, muscle flexibility, art therapy, cognitive, behavioral, or mood problems among employees. The quantitative analysis of Yoga interventions at workplace are found to be more effective as a measure for stress management in workers. For promotion of employee's involvement for wellness and health programs at workplace, employers are incorporating several corporate wellness programs including check- up camps for eyes, heart skin cancer and obesity and many more.

Figure 5. Tabular analysis of 12 manuscripts to demonstrate improvement on concentration, stress, social and intellectual functioning by yoga and meditation programs using 14 common protocols

Sr.No.	Criteria	(Karimi, L., et al.,2019)	Ferreira-Vorkapic, C., et al., 2018	Ellis, J. M. et al., 2017	Bhavanani A., 2017	Karmarkar K., et al, 2017	Bajaj, et al., 2016).	Deb S., et al., 2015	Dwivedi U., et al., 2015	IvtzanI., et al, 2014	Lykins E., 2014	Ross. A., et al., 2014	Aubrey A., 2007
1	Was the method of randomization was clear and appropriate?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Outcome assessment was positive or negative	positive	positive	positive	positive	negative	positive	positive	positive	positive	positive	positive	positive
3	Result analysis was well described or not	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Sample size was justified or not	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No
5	Reasons for withdrawal was explained or not	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
6	Dropout was <10% or more	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	NA
7	Yoga intervention was adhered or not	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
8	Mediation intervention was adhered	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Mudra Science was taken during Yoga postures or not	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes
10	Pranayama was united with Yoga module or not	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Attendance for complete session was > 75%	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12	Manual or protocol was given to the subjects or not	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No
13	Outcome measure was mentioned or not	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
14	variables taken were health, physiological or quality of Life	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

RECOMMENDATIONS

The practice of Yoga, Pranayama Meditation and Mudrā practices develops positive psychology with mental and physical well-being, personality development with fulfilment of joyous living can be attained with its basic practice (Ved Murti Pt. Sri Ram Sharma Acharya., 1995). It is recommended that Yoga Practice may be prescribed by the doctors as an additional therapy to common people who have suffered health loss due to Covid 19 pandemic or due any physiological disorder of the body system. It is also recommended to consider theclear instruction on breath work, postures, relaxation techniques, and meditation on different methods of Hatha Yoga, Ashtanga yoga, Iyengar yoga and Bikram yoga and meditation techniques (Ross, A., et al., 2014).

NOVELTIES

At the workplace there is huge work pressure besides personal tension of employees hence alternative interventions is required for sound physical and mental health of employees. The author team has tried to give an insight through this review paper to check out the effect of Yoga, Pranayama Meditation and Mudrā practices which are simple, workable and can be practiced without much stress and strain. It provides appropriate ways to improve the health and quality of life of employee's further yoga may establish spiritual essence in common man, this may be considered as major novelty of this manuscript.

FUTURE RESEARCH AND DIRECTIONS

This research design is developed for need for holistic development of corporate workers in order to reduce the severe loss of skilled workforce due to psychological disorders like stress, anxiety, distress etc., causing hinderance for human race to flourish however there is scope of future research in this area. The Corporate Yoga as a tool can be customized in future for a specific organization to cope up with stress, anxiety, distress etc. The study can be undertaken separately for physical health, physiological benefits and mental health benefits with practice of yoga asanas, meditation, pranayama and Mudrā formation,

For future scope there are lot of possibilities to explore more on mind-body synchronization through Yoga asana and meditation. The intervention can be done on group of individuals with different age group and with different rank of employees who may have mutual goals.

For correct evaluation of effects of yoga on a particular population, methodology adopted should be supportive, statistical test should be error free. sample size should be scientifically proven and systematic randomization of sample is essential for establishing results with high degree of variability between intervention methods.

CONCLUSION

The present manuscript concludes that Yoga has grown as a global spurt this is evident by a constant liking for yoga and its growth in the corporate houses across the world .The reason for this spurt is because of its low cost structures, simplicity, inclination of people towards natural modalities, people

216

have started understanding that yoga has the potential to prevent life style disorders and has possible treatment of psyche ailment. Youth of modern world has stared understanding close interconnection between Body-Mind-Soul hence started adopting yoga comfortably.

Meditation improves mental health of employees, and the effects are mostly on relieving psychological distress and anxiety. Meditation and Yoga both are very beneficial for leading a healthier life. It is concluded that the effect is independent of age, status and gender.

It is concluded that holistic and integrated approach toward different yoga Pranayama meditation and mudra techniques would enthuse the senior executive's CEO's to support the authors view on the subject. For leading a healthier and peaceful life Yoga and Meditation techniques is being adopted in the workplace of corporate sector.

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Chapter 15
Artificial Intelligence in Human Resource Practices With Challenges and Future Directions

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ABSTRACT

Artificial intelligence is a branch of science and technology that has been used effectively over the decades in various fields, and now it has become an indispensable part of organizational practices as it is one of the leading technologies in the current era, and now there is an emerging trend of applying AI technologies within the businesses. The central necessity of human resource management is also majorly based on technological approaches as it became a potential need for any human resources department to perform its role in the development of the whole organization. Technologies based on AI are and will be the smart system of the future and it's also changing the processes of human resource management by making it more dependent on advanced technologies. Through the chapter, the researcher will get to know the artificial technologies being practiced in HR practices and explore the probable and potential of technicality of AI in HRM and also the challenges associated with AI in HRM and its future possibilities.

INTRODUCTION

The concept of Artificial Intelligence (AI) has existed for a century but it is highlighted more effectively after the 1950s (Prasanna Matsa, 2019). Human laborers started replacing machines in the 1970s when computers and the internet started becoming a part of working life (Yawalkar, 2019). 2012 came with a new wave of AI and the investments have been tripled from millions to billions between 2012 to 2016

(Lorenzo Milani, 2017). HR professionals also witnessed the electronic-Human resource (e-HR), where the internet has emerged with human resources (HR) and the concept of the Human Resource Information System (HRIS) came to attention when electronic means are increasing. The HR leader started taking interest in the Human Resource Information System (HRIS) because of its competitive advantages (B. Hmoud, 2020). Now till the present one can notice that AI has come with major advancements and implications in many sectors, a research done by Microsoft showed that AI-based speech recognition application performance was matching human performance (Resse, 2016). Especially during covid-19, AI technology-based programs and applications gave a developmental push to organizations. It became necessary for them to adopt this technology to continue their businesses. Nowadays businesses transforming their practices through many technologies, and Artificial Intelligence is one of the leading technologies that promoting organizations towards productivity.

Artificial intelligence is perfectly efficient to work as the brain of humans and able to give fruitful outputs from different inputs. The data set managed by human resources is quite small in comparison to data science. It became easier to deal with large data with data science. As in any domain of any organization the right techniques are required, the same is applicable to human resource management (HRM) and artificial intelligence (AI) is one of the leading directions to be applied potentially to human resource practices in the present era. With the transformation of time, we have seen the changes in the disposition of jobs that have already grown labor-based to skill-based, and now the skills set requirements are changing into the skill demands that can handle automation technologies. Automated technologies making tasks easier and give efficient and effective results with proper utilization of innovation.

Employees are an important and necessary asset for the organization as their skills and knowledge play a big part in the overall performance and production of the organization. Artificial intelligence (AI) is a technological tool that gives outputs after combining technology and human intelligence. AI tools help save time and energy for employees by self-regulation processes, and this is how AI is affecting the traditional working style of human resources. HR professionals realized that they have to work and prepare the best organizational strategies with AI tools for HR practices like hiring, performance management, etc (Ruby Merlin,2018).

Selvaraj (2019) described briefly about the last four industrial revolution in his article where he mentioned that first industrial revolution i.e; Industry 1.0, was began in 1700s with initiation and launching of engine powered machines by water, coal and steam. Industrialization advanced with the new energy resource such as electricity, gas and oil in 1870s in Industry 2.0. After that the use of electronics and computers has begun and came into Industry 3.0 during 1970s where the use of information technology, microprocessors and robots has been started. Industry 4.0 came with the concept of digitalization, advanced connected devices and technologies. The next two decades is headed towards the Industry 5.0.

With technical intelligence and digital transformations, industries have been reached their fourth stage which was established as Industry 4.0. Human Resource Management (HRM) was also a part of this fourth industrial revolution and it is going to be more focused in the era of 5.0. The question is still there that how HR professionals perceived the Artificial Intelligence techniques in human resource practices and to what degree Artificial Intelligence will impact Human Resource Management (HRM) by its existence and implementation. With the growing phase of artificial intelligence, it has been assumed that it will affect employment and may create a risk of unemployment on a larger scale.

To remain competitive in the current globalization of the economy, it is necessary for organizations to adopt automation technologies for HR-related decision-making processes. In the era of Artificial Intelligence 5.0, employees also prefer a more technologically personalized environment (Sierra Ce-

dar, 2018-19). Only a few organizations have adopted machine learning, and few are in the process of evaluating the technology to such an extent that they can use them in the future. It has been researched in a study on the Human Resource Department of some Indian IT companies that HR professionals are having a positive perception towards advanced technology and they convinced that automation technology will be a part of the HR workforce in coming years and it will be man-machine collaboration (P. Barani Kumari, 2019).

An AI system launched and patent by IBM as a Predictive Attrition Program, which can predict the reason for employee resignation or quitting the job, and the accuracy claimed by this software is 95% (Shipra Mathur,2019).

Artificial Intelligence Era 5.0 can give huge economic benefits as it is in the exploring phase, it has the capability to change the present. AI has become the smart system of the current era and it is impacting and changing the recruitment and selection process by making it more dependent on advanced and revolutionary technology (Bilal HMOUD, 2019). It has been found that Machine learning has made innovative advancements in the last few years and artificial intelligence is being used everywhere from mobile phones to flight controls (Ruby Merlin P, 2018). Researchers also have found that the most of the workers of the organizations are excited to work with robot co-workers. (Nicastro, 2020)

ARTIFICIAL INTELLIGENCE IN HUMAN RESOURCE MANAGEMENT

Artificial Intelligence in Recruitment: As the HR department is moving towards digitalization with artificial intelligence, and these digital processes supporting recruitment, screening, selection, and interviewing, it is also supporting in decrease the administrative work burden and enrich workplace learning. As interviews are the part of recruitment & selection process, a new form of video interviews based on Artificial Intelligence techniques which are known as asynchronous video interviews (AVIs) has been offered by several platforms, AVIs can be done anytime and anywhere in the world, it works more efficiently for employment screening (Hung-Yue Suen, 2019). To increase the efficiency at the workplace, use of AI tools has been increased like Engazify (to provide feedback), Obie and Niles (for knowledge sharing), Wade and Wendy (for Career advancement), and Duolingo (learning domain). One of the researches on the use of artificial intelligence in video interviews revealed that asynchronous video interviews (AVIs) with AI algorithms are the most popular ways to screen the candidates, but it has been also noticed that there are not many witnesses with respect to features that it can improve the screening beyond the cost and time.

AI has transformed the hiring functions for Talent acquisition and talent development. *Belong.co* is a platform of hiring, based on predictive analytics with machine language (Shipra Mathur, 2019), It enables and helps in finding the best talent with their openness towards moving to the new organization.

AI-engine tools can gather structured as well as unstructured data from the resumes of candidates and organize or select them as per the job requirement, this can help to avoid unnecessary attrition or rehire costs if employers hire relevant employees with AI-based tools. The presence of AI in recruitment and predictive analysis will replace human interference in routine tasks of recruitment (Richa Verma, 2019). Machines are observed to perform better than human resources by improving talent retention and minimizing the attrition rate. By technological changes, the future focus of research will be on the advancement of automated technology that can help HR professionals in hirings where AI can reduce the human-related work by automation of tasks.

Artificial Intelligence in On-boarding and Induction: New joiners can get the required information related to their job profile at the time of Onboarding through structured applications based on AI technology. Artificial Intelligence allows Human Resources to enable a customized response application for common queries of the new joiners including detail of their job responsibility, company's rules and regulation, policies, company information, etc. The application can also include the information of the hierarchy of reporting managers with their contact details (Mobinius Editor, 2020), conducting an effective onboarding process can result in long-term relationships among the organization and employees.

Artificial Intelligence in Training and Development Programs: Developmental activities such as training and development programs can be handled through Artificial Intelligence. AI-based training and development program allows employees to learn or enhance their skills by their own. It can give numerous benefits to employees to gain more knowledge about trending technologies. An AI-based application program can detect and allocate the appropriate and right training to the employee by examining the present skill-set. For the existing employee development program, an AI-based application program can analyze the past data of the employees and suggest the required training need so that they can get the training at right time (Mobinius Editor, 2020).

Artificial Intelligence in Performance Management: AI tools identify the good and bad performance of the employee by automated reviews of the performance. It allows collecting information without any delay in case of immediate action. Managers can bring out real-time data for the analysis so that the decision can be taken on the basis of current data. Assessments and evaluations can be done without any mental or emotional biasedness that can help in improving the overall performance of the employee. AI-based performance management will help in improving talent management because retaining or choosing the right talent is important. The traditional way of annual performance reviews is out of date and it will be underrated in business value. Artificial Intelligence and machine learning will improve talent management with performance management (Ray, 2021). The future of performance management will be bright with artificial intelligence with high advancements

The first service which was affected by artificial intelligence is IT services, as customer-based services like help centers, customer care, and chatbots are becoming more automated. The use of machine learning has replaced some functions of Human Resources Management specifically in the IT industry (Malathi Sriram 2017). Model-based findings on some companies concluded that there are many innovative ways of implementing Machine learning and Artificial Intelligence in Human Resource functions.

There are companies who've started investing into AI for their HR workflows, and most of them have invested to analyze the experience of candidate as per the job requirement as companies take this part as priority. AI also involved in better understanding of the employee referrals by examine the kind of candidates referred by the employees and finding who reffered the fortunate, hardworking and successfull candidate. (Nicastro, 2020).

Stefan Strohmeier (2015) picked up six scenarios based on the capability of artificial intelligence that can be required in human resource management, on the basis of a specified task approach. The explored six selected scenarios are as follows, Turnover prediction with Artificial Neural Networks (ANNs), Candidate search with knowledge-based search engines (semantic search engines), Staff rostering with genetic algorithms, HR sentiment analysis with text mining, Resume data acquisition with information extraction, Information extraction and Employee self-service with interactive voice response. This basically highlighted on basis of presumption and broad application potential of AI techniques in all categories of HR tasks. The potential of AI techniques is successful if their functions meet the requirements of HR

tasks. In particular, data mining technique method and information extraction techniques can be used for recruitment and employee selection, for employee development intelligent agent techniques can be used.

Artificial intelligence enables human resource leaders to upgrade the efficiency of workers, but on the other side still we have its impact as fear of losing jobs in people due to the automation of tasks. Software design under AI technology is able to ease challenging jobs like recruitment and search out the proper candidate from a large data within a limited time. For training purposes, AI software provides personalized learning data, an AI program has the efficiency to measure the engagement of employees and can do the comparison of the outcome whether it resulted in learning or not. Work environment biasedness and favoritism is also a challenge for HRs to get the right feedback. AI-based appraisal or reward can be conducted to check the efforts of and in between the employees. Recruit the right and talented candidates are hard and it is harder to keep them. 57% of firms consider employee retention a severe issue (Omer and Michael, 2015). AI can perceive the needs of individuals related to their raise or disappointment with unbalanced work life. AI tools that can enhance the employees' skills must be adopted by the organizations. The future of HRs will be surrounded by automation and human-machine collaboration (Ruby Merlin,2018).

Artificial Intelligence (AI) in Human Resource (HR) is a real killer app (Josh Bersin, 2018), It is being started used in most areas of managerial activities, but risks may occur if it is not used properly. Artificial Intelligence tools are helpful in finding the fraud and compliances of a person with his/her crime records or bad intentions towards the company's network data. The outcome of AI algorithms is based on the past and cannot be transparent, so there may be some riskiness in using AI. To ensure doing the right thing and authenticate, transparent AI will be needed. The AI in HR will be successful only when it has big correct data will be there to train its system to give correct results (Prasanna Matsa, 2019).

There is a big positive side of Artificial Intelligence (AI) in Human Resource Management that it is already grown in different areas and as well as it has also started doing its part for pollution control for the society as Green HRM. AI supports various areas related to Green HRM in HR practices like hiring, performance appraisal, operations, and workforce. By using AI in these processes reduces 55% to 60% of traditional recruiters' jobs with effective time-saving and 80% of help desk has been undertaken by automatic technology which will be converted into 100% in the forthcoming future. AI-based apps are capable of managing thousands of employee data through cloud-based chatbots. An app named AskDexter is based on the same technology and the specialization of the app is related to future job openings with preferred skillsets (Vikas Garg, 2019).

Artificial Intelligence has become a part of many organizations but some are still fighting to make headway with data analytics as they are not prepared, only a small number of organizations have adopted data analytics or AI in human resources. Those industries that have adopted artificial intelligence have faced some challenges, but the fact cannot be ignored that all of the efforts are made so that employees can use data analytics and predictive analytics (Peter Cappelli, 2019).

HR professionals have a positive attitude and trust toward the new emerging technologies in which AI methods apply to support HRM effectiveness inside the organizations and its capability to uplift the quality and HR leaders are encouraged to follow up on research and explore its potential effect on HR functions and practices because AI will help in reshaping of the business (Bilal HMOUD, 2020). The human resource department should be clear about how artificial intelligence can be used to upgrade HR management and what could be the challenges they face while adopting the AI system (Shipra Mathur, 2019). An experiment conducted using a social robot to interview some candidates, robot evaluated candidate's behavior based on verbal and non-verbal variables and gives results against the company's

emotional and cognitive profiles for existing employees in order to support the selection decisions (Khosla et al., 2016).

The work structure of organizations will change drastically in the coming years as the role of artificial intelligence will increase. Artificial intelligence has the forceful potential techniques through which HR functions can be improved. Much progress has already been done in the area of HR with AI technology and it is still going on to make HR practices more effective. Artificial Intelligence is reinventing human resource practices that focus more on strategic work rather than traditional tasks. AI tools will be a valuable resource for Human Resource Department. AI tools are being used by many organizations in Recruitment, Training and Development programs, Performance Management, etc. Mostly organization has successfully integrated AI-based tools in screening recruitment and selection, AI facilitates the Recruitment process with its techniques of screening and electronic automated messages. It is believed by many experts and researchers that in the coming future AI will be everywhere in human resources management but organizations still have concerns with the high cost allied with it. AI is also supporting Green HRM by eliminating more human work. With the automation of tasks and replacing humans with machines, the fact cannot be ignored that people are going through the fear of losing jobs but on the other side new job opportunities will be developed with the change in skill sets and also it gives an opportunity to learn new skills to the people. In India, only a few organizations have adopted AI in HRM functions, so the overall effect of this is yet to see. AI is executing very well the simple activities of HR, but how far it can take up the complex issues of human resources that are needed to be known and the complexity is the area that needs to be explored more. HR departments should open for the changes as it is the present requirement for any organization to stand in the business market in the competitive world.

CHALLENGES AND RESISTANCE ASSOCIATED WITH AI IN HRM

- AI-based tools find the best talent in less time with all the technical requirements, but they are not capable to address the non-technical or cultural qualities of a human, as these traits also matter to the organization, it is convinced that the system will include these features with time (R Bhagyalakshmi, 2020).
- Industries are moving labor-based to skill-based due to automation, and with this effect, it is earning a negative name that AI will take over the people's jobs and AI will reduce employment. In a survey, conducted by HR.com in 2017 respondents predicted that there will be more job losses in proportion to job gains cause by AI presence organizations.
- The fact that cannot be ignored that machines cannot replace human beings fully, no matter how advanced they are, as humans have emotional intelligence, it will be an impossible task for machines to replace them. Human beings are more complex in comparison to machines and with proven studies, it is very clear that customers don't like to go to machines when they are searching for solutions to their problems.
- Employee's reactions towards algorithmic automated results or decisions also matter due to the concerns of judgments or legal issues, which can be difficult for employees to face because decisions are delivered by the machine.
- It may be difficult for employees to adapt or learn the AI tools, choosing the right candidate to handle or manage the AI tools can be a challenge for an industry or to the HR department (Yawalkar, 2019).

- As decisions related to technology implementations on the whole industry include the higher authorities' involvement, it can be a limitation or challenge to restrict the HR department to make decisions in day-to-day life as technology overcomes the authority and role of HR into decision making in an organization.

Future of Artificial Intelligence in Human Resource Management

- As per the survey "The state of Artificial Intelligence", conducted by HR.com AI has the ability to upgrade HR practices.
- A survey conducted by ServiceNow revealed that 70% of 350 respondents believe that AI-based tools will improve recruitment.
- For the interviews and screening of the applicant's quality, Intuitive solutions and chatbots will be used. Intuitive artificial intelligence solutions are self-driven tools or machines that will work on the basis of intuitive capabilities. It is believed that the Recruitment and selection procedure will be done on intuitive levels with the utilization of AI technologies. Robots with highly interactive functions, social, emotional, communicative with picture and sound will be used for face-to-face interviews in the near future (Bilal HMOUD, 2019).
- Remote HR will become a trend in the coming future, as more companies are shifting to work from home. Remote HR offices based on Artificial Intelligence will be the future model of HR offices that will provide smooth officialism and fast solutions.
- Artificial Intelligence will eliminate human biasedness completely (Chapman, 2021). The AI-technology-based system will help lower the chances of partiality or biasedness while selecting candidates on the basis of appearance, skills, language, etc.
- Automation technology of artificial intelligence is used in sending multiple interview invitations, application rejection letters, and other information without using any human resources. That will help in saving time and money both at the same time.

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Chapter 16
Artificial Intelligence Inroads Into HR:
From the Present to the Future

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ABSTRACT

Artificial intelligence is already here in all facets of work life. Its integration into human resources is a necessary process which has far-reaching benefits. It may have its challenges, but to survive in the current Industry 4.0 environment and prepare for the future Industry 5.0, organisations must penetrate AI into their HR systems. AI can benefit all the functions of HR, starting right from talent acquisition to onboarding and till off-boarding. The importance further increases, keeping in mind the needs and career aspirations of Generation Y and Z entering the workforce. Though employees have apprehensions of privacy and loss of jobs if implemented effectively, AI is the present and future. AI will not make people lose jobs; instead, it would require the HR people to upgrade their skills and spend their time in more strategic roles. In the end, it is the HR who will make the final decisions from the information that they get from the AI tools. A proper mix of human decision-making skills and AI would give organisations the right direction to move forward.

INTRODUCTION

Most of us on social media and online purchasing would appreciate that when we visit a site for any random purchase or information, we find the same type of information popping up again on our social media accounts. Again, when we try to book flights, trains, hotels online, a chat box pops up, solving our simple queries. What is this? This is artificial intelligence, where the computers understand our interest and try to show the data and information related to our interest. How does this occur? It occurs because of the information fed in the machine, taking insights from our activities and making decisions.

Since the twentieth century, there has been a rapid transformation in the socio-economic environment of the business. Machine learning, Artificial intelligence (AI) and automation are now part and parcel of our day-to-day communications, online transactions and interactions, and everyday working lives. Artificial intelligence (AI) has been glorified for having the potential to endlessly provide opportunities to provide fast, readymade solutions to consumers. However, that is not the end. If AI can make the customers happy, it must possess the capacity to help and empower the employees.

According to Kaplan and Haenlein (2019) AI is the capacity of the system to understand and analyse the external data to find solutions and provide flexibility and adaptation in achieving the goals.

AI improves the intelligence of employees by helping them understand complex situations and take decisions (Bader and Kaiser, 2019).AI further improves reasoning ability, ability to understand the context, improves communication and self-organisation apart from creative thinking ability of individuals (Eriksson et al., 2020). Business all over the globe with experience and trained employees expect that AI would provide solution to many of their problems (Liu et al., 2020).

The fourth industrial revolution's edition in fact started because of the growth of big data, AI and robotics. (Grover et al., 2020). These technological interventions act as a facilitator that complement the human effort and are not there to replace the human element as misinterpreted by many (Jarrahi, 2018). AI can employees can exist in a symbiotic relationship where they provide mutual benefit for each other. However, this changes the allocation and arrangement of resources that exist in the organizations (Xu et al., 2020). This may disrupt the association between organisation and individuals, leading to change in the individual-organization fit structure.

AI can be understood as decisions taken by machines from the data and information fed in it. The intelligence that humans possess is tried to be created artificially. Artificial intelligence (AI) has found to be affecting and changing our life styles since quite a time, but today its presence is more important in the arena of present industry 4.0 and the industry 5.0 which are started knocking our doors. The human resources (HR) division is facing the similar types of changes moving from traditional manual ways of working and moving to a stage where every process is fully digitalize. It improves the response rates and simplifies various process of HR starting from recruitment which give a lot of help and support to the modern workforce. It is predicted that almost one-third of roles would now be done by technology. In such a situation all eyes fall on the HR department and their management (Personnel Today, 2015).

While Industry 4.0 of today talks about digitalisation which consists of connected devices, data analytics and AI technologies to automate the processes further, the future, which is industry 5.0, consists of personalisation which would require cooperation between man and machine, as human intelligence and machine cognition will work for hand in hand. It is the concept where robots help humans in their work to get results. This is further enhanced with the advanced technologies like the Internet of Things (IoT) and big data. This concept adds human and personal touch to the industry 4.0 pillars which focus

on efficiency and automation. For this, the employee needs to be upskilled, leading to mass customisation and personalisation to customers.

INDUSTRY 5.0

Industry 5.0 is the future, and the trend has already started. Whereas industry 4.0 focussed on technology, industry 5.0 will focus on integration, collaboration and interaction between man and machine. AL which revolves around imitating human intelligence, will become further crucial in the industry 5.0 scenario, especially within the HR context. The collaboration between man and machine would not be possible without the support and integration or rather updation of HR processes and systems. In such a scenario role of AI in HR and then the role of HR for industry 5.0 becomes furthermore essential.

The focus of Industry 4.0 has been majorly on technologies without much focus on environment protection and sustainability. Various AI algorithms tried to analyse the perspective of sustainability but not much was done in this (Xu and Ashton 2020; Chen et al., 2008; Yetilmezsoy et al., 2011; Papadimitriou 2012; Alzoubi 2019). A strong action and focus were required and everyone was looking for a solution from the technology to help in saving the environment and improve sustainability. This answer was finally given by Industry 5.0 which brings back the human factor. As such the role of AI in HR becomes much more important in Industry 5.0. The Fifth Industrial Revolution pairs human and machine to further use human intelligence and creativity to increase efficiency and effectiveness. Industry 4.0 focussed on automation, Industry 5.0 focusses on a synergy between autonomous machines and intelligent humans. The machines and robots will work as co-workers of humans. They will work as collaborators, understand the perception and perspective of human employees and work accordingly. It will result in a remarkably efficient, effective and value-added production process. The wastage will be less and thus the cost of production would be less. The definition of "robot" would change in Industry 5.0. It would not just perform repetitive programmed work but act as a companion of human employee. It would now be called as "cobot"- companion of human employee. Industry 5.0 would mean "intelligent devices, intelligent systems, and intelligent automation" automation in companionship and supportive with human intelligence. For example-The manufacturing pipelines will be taken over by enthusiastic "human /robot collaborator". Organisations would get technical assistance in a decentralised decision-making structure which would actually be a cognitive support and but not elimination of employees. In the context of all the above the role of HR in AI has a wider role to play in Industry 5.0 and its understanding and implications are much more important.

CAN AI HAVE A ROLE IN HR?

According to Oracle and Future Workplace AI @ work-study survey, new technologies are becoming mainstream business processes. Right from blockchain to the Internet of things, technology is penetrating the processes. AI is one of these which is changing the dynamics of employee relations and expectations. Along with these technological innovations and changes, there is also a change in the employee generations that are joining the organisations. It is believed that by millennials or Gen Y and Gen Z will be constituting three-fourth of the workforce by 2030.These Gen Y and Gen Z (born after 2000) are techno savvy. They are growing and blooming in the era of smart phones internet and social media.

The expectations of this generation are quite different from their employers. They believe in anywhere-anytime interaction, instant feedback, culture of openness, and data-driven decisions. In such a situation, AI can be the right solution to integrate and align the needs, desires of the new generation of employees and keep pace with the changing technological environment. As such, its integration into the need of the hour and compulsion for the future. Human resources are one of the most significant departments of every company, be it a service provider, a manufacturing unit or a start-up. It has a crucial role in the professional and personal lives of the employees working with them. It deals with the emotional and practical side of the workers and maintains a safe, healthy and conducive environment. It needs to recruit the right talent, maintain and sustain them. AI can be a one-stop solution to many problems of the HR department.

According to PWC's Global Artificial Intelligence Study (2017), AI could contribute $15.7 trillion to the global economy by 2030. HR managers need to take care of this reshaping to sustain organisations and HR today and tomorrow. According to this Oracle report

- AI has changed the relationship between people & technology at work.
- People now trust robots more than managers
- Managers need to take up a new role.
- AI is the future -is here to stay. So, organisations have to take measures to simplify and secure AI.

Just like analytics, AI has enormous potential. It helps in completing repetitive tasks quickly and more accurately. This is its main advantage. By this HR professionals can give more time to work on human-centric tasks.

Kaplan and Haenlein define AI (Figure 1) as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation". They have classified artificial intelligence into three different AI systems: "analytical, human-inspired, and humanised artificial intelligence".

Figure 1. Kaplan's concept of artificial intelligence

234
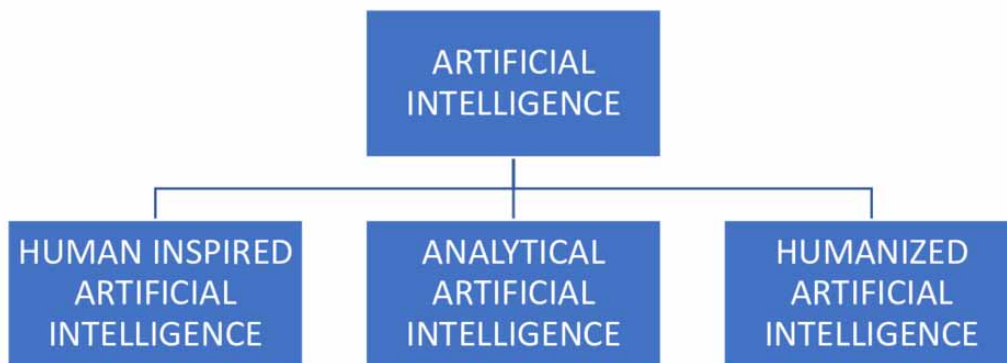
Analytical AI consists of "cognitive intelligence and cognitive representation of the world, which is learned based on experience and is used to take future decisions."

Human-inspired AI has "elements from cognitive as well as emotional intelligence. Human emotions are an important constituent of decision making".

Humanized AI shows "characteristics of all types of competencies (i.e., cognitive, emotional, and social intelligence), being self-conscious and self-aware in interactions with others."

APPLICATIONS OF AI IN HR

AI makes machines imitate human intelligence and make decisions. It helps the people. The machine analyses the data based on several algorithms and gives responses; these responses then help in decision making. Managers are making decisions on day-to-day basis, so certainly AI has a role to play. The customer's needs, expectations and profiles keep on changing. They are not same at all times. Similarly the knowledge, skills and attitudes of employee and behaviours also vary from time to time and from one team member to another. Many times, an employee has to handle a customer in which he is not competent enough. No one can be good at everything, but everyone is good at something. Things would be different if employees get to handle the customer enquiries, they are best at. AI makes this possible. The technological intervention can take into account humungous amounts of data, process it, analyse it. It will then match the customer and the employee thus giving the customer a chance to interact with the employee who is the best match for his requirements. This leads to reduces response time, higher efficiency, low cost, more revenue and finally satisfaction of both the customer and the employee.

In all organisations, there are repetitive administrative tasks that are there within all the jobs. When AI takes care of these repetitive jobs, which otherwise are monotonous and take much time, the employees can focus on more strategic work that requires empathy and real-time judgment. If employees get to do more exciting and challenging work, they enjoy their work, are more productive, and their engagement with the organisation also increases. This also elongates the stay of the employee and he doesn't plan to quit easily.

For proper integration of AI into the system, HR leaders will be required to contribute to strategic planning on an organisational level. However, many times a load of administrative tasks can often hold HR professionals into taking up the decisive role. AI can provide a solution to this problem. HR professionals spend on administrative tasks. AI can take up all this role, and the HR department would become more effective.

Employees have been found of complaining about discrimination in selection, appraisals and promotions. They have been complaining of favouritism in job descriptions as well. This can be removed with the help of AI. AI algorithms are the solution to it. They can be designed and configured to find the right employee, thus removing bias patterns. AI applications can be used to analyse job descriptions. This would remove gender and language biasness and lead to a diverse workforce (Figure 3).

Let us discuss how AI and its decision making can help the HR people.

235

Talent Acquisition Process

Recruitment is the process of getting the right candidate on board who possesses the right set of knowledge skills and attitudes. AI can be helpful for both the organisations and the candidates that apply. For example, AI can help user-friendly design applications, which will help get the required information, and the junk of redundant applications can be reduced. This also improves the applications completion rate. AI can help in shortlisting the applications, sustaining the databases, scheduling the interviews. AI can help answer routine questions of the job applicants, thus helping the HR people focus on other non -routine activities. They can focus on employee management, sourcing, recruitment marketing, and many more productive exercises. This would help save the time and effort of the HR that they would otherwise spend on mundane tasks.

Though AI technology integration has started in the recruitment process however this integration is still in its nascent stage. According to Global Human Capital Trends survey taken by Deloitte's (2019), only around 6 per cent of respondents agreed of having the best technologically driven recruitment process. 81 per cent of the respondents believed that these processes in their organisations were far below the desired standards. Therefore, there are huge opportunities for HR professionals to adapt and integrate their processes with this advanced technology and reap the benefits.

HR departments who always look for better and improved processes can solve most of their problems through AI. AI algorithms can be continuously revised and updated as HR departments require. The programmers can set algorithms, or formulas, for situational parameters, like the skills required, the number of candidates to be screened, types of job, hours, work environment and competition.

Further, the penetration of smartphones into our lives has integrated smart apps on individual's mobiles. The future that lies in the hands of employees of generation Y and Z can be targeted by strategically popping up job advertisements in their mobile apps which are most relevant. The jobs will pop up based on their preferences, profiles, and skills updated in their apps' settings. AI and Big Data help match candidates' resume with the job profile. This would help in choosing only those applications that have a high probability of being possessed further because of matching eligibility criteria with the job requirement, thus leading to a better job fit. This therefore reduces the recruitment cycle time and overall cost of recruitment spend on choosing and screening the resumes.

The tests conducted for selection can now be automated and customised rather than generic testing (Figure 2). This would help in better employee performance in future. With better internet connectivity (4G/5G), the interviews can now be conducted via remote video conferencing in real-time. All this will reduce the time and money invested in the recruitment process and thus reduce the overall recruitment cycle. The chat-bots of AI can help in analysing and interpreting the responses of the candidate in real-time. The data can be validated also, thus it will reduce the interviewer bias.

Figure 2. Selection process

AI has also played an essential role in maintaining a applicants database and then retracking it. By keeping a track of the database and records of applicants who had applied in the past, AI technology can analyse the large number of applicants and segregate those applicants that would have a good job in the new roles. As a result, HR professionals can quickly and efficiently track the right talent rather than spending time, money and resources looking for new talent within or outside.

AI Algorithms can scan resumes, decode video interviews and gives signals to the HR professionals about good candidates, high performers, and candidates who are likely to succeed in near future. For example, one organisation has used Pymetrics' AI-based gamified assessment to screen out the applicants for its marketing and sales roles. As a result, they were able to get success by over 30% while removing all the "interview bias" and "educational pedigree bias" present in the current process.

Onboarding of New Recruits

Once the process of hiring is over, the new hire moves for onboarding, where she/he gets to know about the organisation policies, facilities, rules, regulations, agreements, reporting officer and teammates. Some of these steps are routine and time-consuming. To save time, AI can help in continuing this process even after standard business hours—a vast improvement over the traditional onboarding. After hiring suitable candidates, the AI consolidated systems will then help introduce and induce the newly hired employees to the company. It would provide information, rule and regulations on the joining day or even a day or two before the new joinee joins in. New employees will get all the crucial information with the help of a mobile application or "structured information" on their laptop. Onboarding which is a crucial process to improve the cultural fit of the new joinee and improve the productivity in the long run.it will benefit the HR team, reduce grievances and will have long term results. If done systematically, onboarding goes a long way in building a long-term relationship with the new recruit. It has been found that the candidates who go through a well-organised and informative onboarding process generally tend to have a long-lasting relationship with the company. AI technology allows new hires to get human resources to support at any time of day and in any location at their own pace. This can be done with the help of chat-bots and remote support applications. This change reduces the administrative burden of the HR people and results in faster integration and absorption of the employee in the organisation.

Internal Mobility

Apart from improving the recruitment process, which organisations usually use in AI and HR, AI can further help improve internal mobility and decrease employee attrition.

Personalised feedback forms can be developed and analysed, which can help understand job satisfaction and employee engagement. This is specifically important in the current scenario when understanding employee needs is very important for the organisation's success.

AI software can predict key performers who could likely be promoted, who have the required skills needed for a project and could be likely transferred or deputed. This, thus, drives internal mobility. By doing all this, the organisation can save talent acquisition costs and improve employee retention.

Figure 3. Applications of AI in HR
*KSA Knowledge, Skills, Attitude

Learning and Training Programs

After employee onboarding, knowledge and skill enhancement are essential for an organisation to succeed in today's competitive environment, AI can create a customised data set of each individual. It can record each employee's job description and job specification, i.e. what the employee's job is and the skills required. It will then keep track of the change in the ongoing technologies and developments in the market. Later it can suggest the training required by employees to keep pace with the changing market situation, thus keeping the employees updated with the market changes. Employees would also know the skills they need to enhance.

Based on their job description, relevant knowledge, skill, and attitude set information will be allotted to better the employees' development. The AI in HR tech can analyse the data from the current information, and the HR team can use the information for proper training need assessment of the employees.

This intelligent strategy will improve the overall working and create a healthy learning environment. The training process would also become faster and more effective. Moreover, the training could be done as per the specific need of the employee and organisation. AI can assist in identifying gaps in knowledge, skills and attitudes for each employee based on the demands in the market requirement of the organisation.

Often, employees cannot perform because they are willing to work but may not have the ability to do it ie. they lack the skills that may be enhanced by training. For example, a customer care executive dealing with customers may be very hard working but may not get the desired results. Here AI can be the "game-changer". Based on their interactions with the customers, AI can identify the poor and best performers and the difference. This difference would focus on the skills and the consequent training needed. Thus, the employee would himself know the skills he needs to groom up. The employee feels enthusiastic and the customers feel that the employee was empathetic towards him. Supervisors come to know about the employees' strengths and weaknesses. This would help them to plan the training module needed. Employees are also happy because they get the training in the area they need and feel that they are supported in their career development. In addition, trained employees with improved skills give better output, and in the later stage they get recognition, reward and their career progresses. Thus, it a win-win situation for all. (Smith, 2019).

Tomorrow when most of the employees would be Gen Y and Gen Z who would like to decide their career planning and would involve themselves in those training programs that they feel are logically important. AI would provide them a solution and help them attain their professional goals.

With faster networks, virtual training can be organised, which can be taken from anywhere at any time. In fact, with the current pandemic Covid 19, virtual training are the only option -the hardcore reality.

Performance and Compensation

Like training, organisations can set performance targets based on individual talent and capacity rather than setting up of the same goals for the same group of employees. AI would help the individuals' set their goals as per their skills and talent. Employee feedback on performance can be a continuous activity rather than once in time activity.

Compensation and incentives structure can be designed and derived from the employee database. This can be done as per skill supply and demand gap.

Promotions can be based on the employees' actual contribution measured using objective (key performance indicator) KPIs. This appraisal based on actual merit instead of only seniority-based progressions leads to an environment of commitment and hard work, especially with the new generation which is entering the workforce.

Health

Health is another critical criteria to be taken care of by the HR department. The "wellness apps" and "Internet–of–Things"–based smart wearable devices can help the HR department and the employees track their fitness parameters in real-time, leading to a reduction in sick leaves.

Talent Off-Boarding

AI can also help in predicting the employee who has the likelihood of quitting. This knowledge would make HR come into action and take strategic actions for retention before it is too late.

The employee profiles could be scanned and analysed to predict such intentions. HR can take proactive steps to prevent high performers from leaving the organisation by providing better opportunities internally.AI can help identify low performers based on past job performance objectively. This would reduce supervisor bias, and further steps for training can be planned. This training can be planned according to the real-time skill gap analysis.

INTEGRATING AI INTO HR SYSTEMS

While the prospects of AI seem good in the current industry 4.0 and the future industry 5.0, adoption requires a significant change in the philosophy and thought process.HR departments would require support from all the levels of management for changes in organisation structure and leadership style. AI will support the leaders understand their leadership style. Their can be a questionnaire which can be answered by the team members about the strength and weaknesses of the leader which can be later analysed with the help of AI. The leaders can go for self-assessment by looking at the dashboard and then improve their skills and attitudes.

The application of AI into HR improves the ability to visualise and take real-time decisions with a logical output. It enhances the cognitive computing ability of the HR team. AI in itself has been designed in such a way that if used systematically it motivates and encourages employees. Employees feel much mental and emotional turmoil in today's fast-changing business environment and the need to update themselves regularly. This is a very crucial aspect which the HR department has to take care of. AI will help them gain insight into the co-worker's mind and analyse their moods and mental state.

A "flat hierarchy-based" agile organisation structure is needed for proper implementation of AI and to adapt to industry 4.0 of today and industry 5.0 of tomorrow. A flat hierarchical structure is required that would reduce the communication time and will lead to fast decision-making process. Decentralisation of authority will make project teams to take their own decisions, make them more autonomous and adjust as per project demands.

Leadership styles need to be more open whereby the team members can resolve their problems. This will lead to a culture of learning and innovation, focus on knowledge enhancements, and rewards would be given for out-of-the-box thinking. Leadership will also have to develop an organisation culture to adjust to the new generation Y and Z so that it conflicts are not created between multi-generation employee groups. Integration of industry 5.0 would require technology modernisation following long-term organisation goals to attract the best Gen Y and Gen Z talent. Automation of many HR processes may lead to reduction in HR team size but would provide HR departments with more time to play a strategic role in the organisation (Angrave et al., 2016).

240

CURRENT SCENARIO

Artificial Intelligence is now extensively used in every business aspect and makes more inroads into HR functions. AI tools currently available in the market have augmented existing job functions and not eliminate the employees. The AI systems are replacing repetitive tasks and helping the workforce do jobs faster and free them up to do more exciting work and maintain a work-life balance. This can help the workforce to move towards more rewarding roles.

If there is a barrier for exclusive use in the HR area, it is the human element. The initial implementation of AI was tools to find out the impact of talent acquisitions and the employees' engagement levels. Now, AI has extended into other domains such as analysing, predicting and personalising the various HR-related decisions. Companies are increasingly using Chatbots or virtual assistants to reach the employees, especially in crisis times personally. Now companies are continuously investing in tools to do better recruiting, developing and supporting workforces. The usage of AI helps reduce the time lag in the case of recruitment. Another area where it is increasingly used now is to give a better-personalised experience in the companies. It is also used to develop metrics to track the learning and development of the employee. Thus, AI is applied to the entire lifecycle of HR, right from attracting to hiring to engaging to developing to growing and coaching employees; this will reinvent the accountability of work like never before

Presently, AI is being used more effectively in the recruiting and talent acquisition areas. A lot of start-up and service providers are providing AI-based solutions for HR activities. Some of the examples are Oracle Cloud HCM, Job Ad postings (Textio); Sourcing (Entelo, Hiredscore); Candidate screening (Pomato); Candidate assessment (Harver); Interview (myInterview); On-boarding (Enboarder); Coaching (Saberr); Talent Management (eightfold.ni) and Employee service centres (ServiceNow). These AI solutions are analytical products that are driven by data.

CHALLENGES

Studies indicate that HR leaders can be at risk if they do not engage in the possibilities of AI. Otherwise, their functions are likely to be taken over by other business functions (Tambe, Cappelli & Yakubovich, 2019). There is less progress on issues relating to employee management using decisions guided by algorithms in the area. Artificial intelligence has made inroads to different areas of HR. However, the organisations still face particular challenges in their implementation. The various challenges can be divided into four areas:

Company Culture

The implementation of AI sometimes requires large amounts of investment. In addition, the HR function in an organisation is treated as a secondary function not related to the strategic goals in a direct manner. Further, the company culture does not promote the implementation of AI strategies. The managers need to have a deep understanding of AI technologies, possible applications and limitations to identify the business needs of the enterprise. This lack of AI know-how can hinder the adoption of AI. Further, AI implementation happens without a properly planned strategy; then, it can create problems. While

implementing AI, the organisation needs to have a strategic approach, set the objectives, identify the required KPI's and track the return on investment on the implementation.

Employee Concerns

The employees in the non-technical roles find it challenging to understand the AI systems. Unless they are skilled in understanding the systems, it can be a bottleneck in their work efficiency. Sometimes, the HR leaders do not have the required technical know-how regarding the systems, limiting the applicability of tech to company processes.

Employees in the organisation have a higher level of comfort in interacting with human beings than AI chat-bots (Oracle and Future Workplace AI @ work-study survey)AI-based solutions using AI on sensitive information can create sensitive insights that the employee does not wish to disclose. The employees fear that the employer may use this as a yardstick in layoffs. The employees also want their organisations to respect their data and seek their permission before deriving insights. The tracking process of AI can be harmful in some ways as the employees are expected to be in a 'switch on' mode 24x7, sometimes leading to burnout.

Issues Related to Data

The effectiveness of AI systems depends on rich datasets and feeding the same into the systems for further processing. The AI system works on larger datasets than the information required by human beings for processing. Hence, if these large datasets are not available, implementing AI solutions can be difficult. AI can analyse data faster than humans can think, but the outcome of the analysis using AI will depend upon the quality of the data and the proper labelling of the data.

The decision-making process in AI is based on the data input and does not have opinions of its own. If the input is faulty or unrepresented data, the insights received would also be biased. There could be inherent biases in the AI processes themselves. For example: In the case of Amazon, it was found that the AI tools for recruiting found males to be preferred in technical departments, and hence the applications with the term women were rejected outright. The AI systems are configured to undertake specific tasks; hence if different tasks are assigned to the same system, it can cause the correct output.

Skilled Workforce

The implementation of AI requires a skilled workforce which is in dearth. The organisation should have the right people who possess the knowledge and capabilities to build and run and maintain the AI systems in the organisation. The companies which wish to implement these systems need people to create Ai solutions, researchers of AI algorithms, software architects, coding experts, data scientists to extract meaningful insights from the data analysed and project managers to implement these systems. The increased use of AI would require the employees to retrain or re-skill themselves to fit into these roles, which needs a human touch.

Legal Constraints

The system requires the collection of personal data for analysis. How this personal data is protected becomes a significant constraint. Data breaches can harm employee productivity and also affect the image of the organisation. The chances of data being sold on the dark web is a threat that organisations cannot ignore. Data privacy and security issues also act as a catalyst to the non-implementation of AI systems. The organisation also has to keep in mind the possible security data breaches; if a breach happens, the organisation can be in trouble.

Complex HR Ecosystem

AI can be limited in the use of recruitment processes. It cannot identify the falseness of the claim made by the applicant. Further, the screening is done by the system also can be questioned because recruitment is done through recruiters assessment of other factors beyond the credentials disclosed by the applicant. There can be a lack of transparency and justifiability in the results obtained using AI tools in HR processes. Further, the fairness of any decision taken on such results can be questioned.

THE WAY FORWARD

In the coming times, organisations would require long term strategies to cope with the industry 4.0 transformation challenges. Al will automate most of the repetitive tasks, resulting in faster cyclical processes of HR and leaner HR teams. Further, it would increase interactions between teams across physical workspaces. This would require a change in the organisational structures and leadership approaches, and the organisations will need to incorporate an improved strategic role in the overall growth of the organisation (Sivathanu & Pillai, 2018). As these technologies become an integral part of the work, they can help facilitate a flexible work system, reduced biases and greater work-life integration In the organisational culture. The analytics agenda can be pushed in a better manner, with Gen-Z as they are better equipped, and they look forward to such organisations to work with an emphasis on flexible working systems and personalised well-being practices. However, in the coming times, with the organisations seeking to push the AI agenda into more core processes, Gen Z must also be equipped with skills to handle the AI-based tools.

AI is a powerful tool. However, it cannot be integrated into systems blindly without the watchful eyes of human beings, taking into account human nature, ethical frameworks and privacy issues. The real issue in the implementation into the HR process is the socio-economic effects that can affect the performance of the employees. The automation of AI processes is not replacing the human element but making much leaner systems and shifting the focus of the skill sets required for the employees from undertaking repetitive tasks to more complex processes with the help of AI in a reduced time. The "5 C" skill set required for the employees would be " Curiosity, Creativity, Critical Thinking, Clarity and Connection". The organisations now lookout for advanced cognitive skills, socio-behavioural skills and adaptive skills in the new work environment powered by AIas these skills are transferable across jobs (World Development Report 2019, The Changing Nature of Work, 70).Ai has helped the organisational leaders to understand their employees better and provide them with a better employee experience. It can help the leaders assess the needs in the area of engagement, reasons of attrition, patterns of absence

from work, and track employees' productivity. With the hybrid work model becoming the norm in the new normal, AI is a powerful tool to track employees' productivity. This could also make the work more flexible without losing out on productivity. Further, it can measure the returns on the various workforce initiatives undertaken by the organisation. It needs to be understood that if the HR departments need to transform themselves and be ready for future work scenarios, they need to embrace AI (Gulliford & Dixon 2019).

For HR leaders, implementing the AI agenda in their organisations would require a new set of skills that are not there in the existing HR Toolkit and ensure that the HR act as an enabler to exploit the data to the organisation's advantage. The organisations have to encourage the employees to pick up data science capabilities and train them to use AI tools to keep the organisations' critical business interests in mind. The other requirement is to have trained professionals who would know to make sense of the data, identify problems, provide potential solutions or assess the solutions provided by the AI system, and then test the solutions. Further, they need to rigorously assess the decisions based on solutions or results provided by the AI tools and modify them to the interest of the organisational goals and employee well being. To help the organisations in a manner where the maximum productivity of its human capital can be harnessed.

Studies also point that improving advanced analytics will help the HR leaders place the right people in the right place at the right time, resulting in the employee feeling engaged and empowered. This not only brings in the right talent, but it also retains it. This, in turn, can help improve the bottom line success of the organisation. However, AI-enhanced productivity tools are expanding to other common professions of lawyers, teachers, and accountants, which are now seen as a threat. The HR ladders should use AI tools to deliver strategic insights and directions to develop the human capital to create a competitive advantage.

CONCLUSION

The World Economic Forum report, "The Future of Jobs", found the current developments in AI and automation transforming the workplace. Specific jobs will become redundant while new jobs will appear on the work horizon. The employees need to keep training and re-skilling them and be ready for the future workplace; to handle that, we would require qualified HR professionals with skills in handling AI systems. AI is going to change the workflow of the HR department.

Using AI in the recruitment process helps the human resource team get deep insights into future candidates. The company's AI chat-bot provides a forum for applicants to interact before recruiters and get personalised updates and feedback. The AI systems can help the company to create better-hiring practices.

AI can enhance the employee experience by embracing the different tools that provide a personalised touch to the interventions done by HR. AI helps to reduce the efforts in human tasks but does not eliminate the need for human touch. Empathy is an aspect that cannot be shown by AI systems, i.e., where the technology fails. When we are applying AI in HR, it needs to human-centric, i.e., Ai applications used in the organisation should serve the needs of the human and help in the human progress made.

244

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Chapter 17
Use of Artificial Intelligence in Financial Accounting

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ABSTRACT

Artificial intelligence (AI) is a huge headway in innovation that has everybody talking about its energizing guarantees in the innovation world. With regards to AI, it additionally incorporates its territories, for example, AI (ML). While AI could be portrayed as the capacity of machines to settle on shrewd human-like choices and improve over the long run, ML includes building models, generally statistical models that give prescient outcomes and can be developed. Many are not extremely educated about this area. While this is true, there is something else entirely to it from face recognition, fingerprints recognition, chat-bots, predictive business models, and sentimental analysis. Beforehand, AI joining in the product advancement was simply conceivable to the huge organizations that had the assets to recruit exceptionally qualified experts. Over the long run, AI structures with high deliberation levels have been created, and with few coding lines in any programming language of the decision, one can have the option to enter in various fields.

INTRODUCTION

Artificial Intelligence (AI) is a huge headway in the innovation that has everybody talking on its energizing guarantees in the innovation world. With regards to AI, it additionally incorporates its territories, for example, AI (ML). While AI could be portrayed as the capacity of machines to settle on shrewd human-like choices and improve over the long run, ML includes building models, generally statistical models that give prescient outcomes and can be developed. Many who are not extremely educated about this area. While this is true, there is something else entirely to it from face recognition, fingerprints recognition, chat-bots, predictive business models and sentimental analysis. Beforehand, AI joining in the product advancement was simply conceivable to the huge organizations that had the assets to recruit exceptionally qualified experts. Over the long run, AI structures with high deliberation level have been created, and with few coding lines in any programming language of decision, one can have the option to enter in various field.

Narrow AI: Sometimes alluded to as "Weak AI," this sort of artificial intelligence works within a limited setting and is a re-enactment of human intelligence. Narrow AI is frequently centred on performing out a single task amazingly well and while these machines may appear to be clever, they are working under definitely a bigger number of requirements and constraints than even the most fundamental human intelligence.

Artificial General Intelligence (AGI): AGI, sometimes alluded to as "Strong AI," is the sort of artificial intelligence much like an individual, it can apply human like intelligence to tackle any issue.

The automation capacity of AI frameworks has prompted a solid accentuation on the manual tasks they can finish in a quick and effective style. This threatens numerous experts including accountants and legal advisors on the grounds that a major piece of their work is without a doubt manual. While these manual tasks are significant, the expert part of their work includes adherence to implicit rules, moral and good commitments as they apply proficient judgment which they are lawfully limited to. Rather than compromising their jobs, AI and ML have the capacity of helping the finance associated people with a segment of their work so they can work more effectively.

The main aim of this report is to investigate how AI is being implemented in different industries, particularly in the field of finance and accounting. This report will discuss the following research questions: What are the opportunities and challenges that come with AI? What are the uses of AI in financial sector? What impact will AI have in the jobs and functions of finance profession and the future scopes and conclusion.

As the flourishing improvement of Internet and data innovation, just as with regards to Internet-Finance, strategy of financial data wrangling is not only limited to traditional statistical approach, for example, machine learning, which has obtained critical achievements.

For instance, Support vector regression calculation and time series model in machine learning are utilized in the presentation measure issue in building up forecast model, which could improve the exactness of predictive models. (F Li, ZH Han, EY Feng. Sciences & Wealth, 2016) In the corporate share market, public consistently wish to get a handle on the standard behind the exchange, which could be utilized for examination and expectation (WQ Huang, XT Zhuang, S Yao. Statistical Mechanics & Its Applications. 2009). Investment experts from all around world are likewise attempting to apply various strategies for transaction examination and data mining in the measure of stock information, to discover possible working standards and stock exchanging rule behind the securities exchange, and to anticipate the financial exchange pattern, aiming to boost the benefit. Since the securities exchange is influenced by different market and non-market factors, which connect with one another, it is hard to set up a precise model to depict the instrument of inside association (T Preis, DY Kenett, HE Stanley, D Helbing, E Benjacob. Quantifying the behavior of stock correlations under market stress (J). Scientific Reports, 2012). Thusly, machine learning is a helping model and is progressively being utilized in securities exchange forecast. With the expanding of PC computing power from CPU to GPU, more modern artificial knowledge calculation can fulfil the need. More specifically, artificial intelligence is widely used in investment management, algorithm trading, fraud detection, advance and insurance guaranteeing. loan and insurance underwriting. Besides, artificial intelligence effects on financial regulation institution, and will assist regulators to determine illegal methods adopted by people, learning from past experience based on supervised transaction with algorithm and analysis of huge amount of data. Consequently, this paper aims to sum up the advancement of artificial knowledge and machine learning in the financial field and suggesting some recommendations to upgrade of financial accounting system and regulation by utilizing AI and machine learning.

Figure 1. AI and its Subsets
(Compiled by the author)
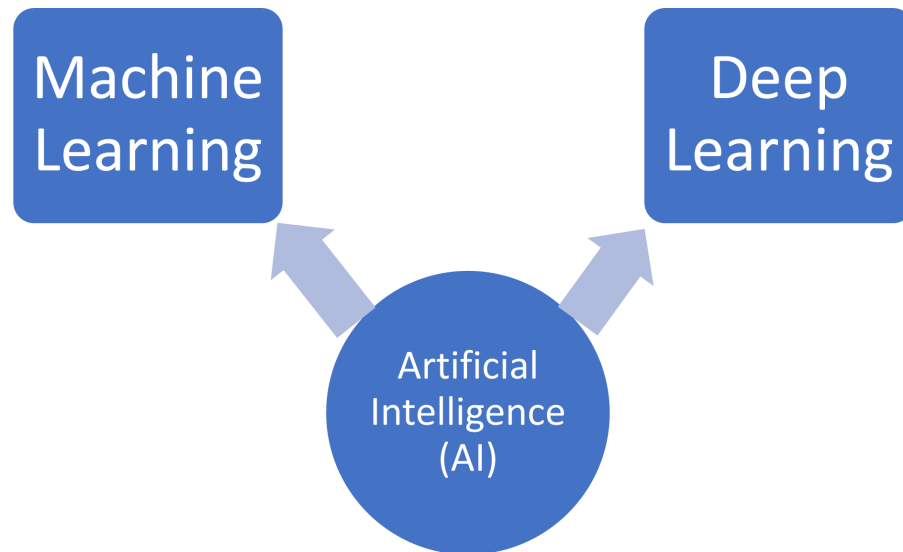
REVIEW OF LITERATURE

2.1 Concept of Artificial Intelligence

While the starting point of AI can be followed more than fifty years back, its prospects have fundamentally ascended in this day and age. This has opened a wide scop for design and implementation of the plan of practical applications, in the financial area withstanding different areas of specialization.

In this chapter, we begin by introducing the concept of AI and the Financial Accounting.

AI is a wide term that identifies with headways that make machines "intelligent" John McCarthy begat the term AI in 1956. There are various terms identified with AI, for instance, Deep Learning, ML, Natural language processing (NLP). (Yaninen, D. 2017. Artificial Intelligence and the Accounting Profession in 2030)

AI's aim is to build up an intelligent and self-sufficient framework. ML is an AI subset that empowers the computer to learn and improve its knowledge without complex programming. There are two strategies AI works, one is symbolic based, and another is information and data based. For the information and data base side called ML, we need to take care of the machine loads of the data before it can learn. Machine can learn in a lot more dimensions. When these models are made, they can make such judgements that individuals can't approach. (Takyar A. 2018. What is Artificial Intelligence? Understand artificial intelligence in 5 minutes.)

2.2 Artificial Intelligence Opportunities

Through the various achievements AI has made during last decade, it is clear how AI has influenced the way that we accept and shape future headways. Organizations incorporate AI quickly into their daily schedules. This has carried ascend to a more streamlined strategy for driving business and eventually

empowers the firm to procure most financial rewards and improving their overall profile and the organizational practices.

AI is as of now used in various field, from financial area to the health sector area. The sort and type kind of the AI required depend upon the assignment. AI can improve business in areas comprising of predictive maintenance, where AI capacity to investigate and analyse enormous number of information and data from pictures to sound and can productively reveal irregularities.

2.3 Artificial Intelligence Challenges

AI has changed the business world. However, in spite of the uncommon ways that machines are changing the business, there are a few pieces of the business world that basically can't work without human participation. AI might harm the repo of the firm if it isn't used and utilized in the most ideal manner.

It is challenging to get enough and wide measure of information for training, for instance making or getting enough information from clinical preliminaries to estimate treatment in medical care. These deep learning strategies create challenges as the initiative is for the strategy to show which conditions prompted certain choices or expectation and how. Another test for AI is making summed up learning procedures, since AI is confronting challenges taking their experience from one level of condition to another. Numerous ventures and firms slack in implementing AI into their frameworks. Putting resources into AI could likewise carry some negative variables into the play that could downsize positive effects. This could mean there will be a rise in the competition. On talent and capability perspective, assembling and optimizing significant network remains an area of expertise.

AI will have other moral and cultural problems emerging, among these are abuse, impromptu consequences and questions with respect to data security. This could be in type of reconnaissance and in financial practices this could prompt results, for example, fraud and cybercrime.

2.4 Benefits of Artificial Intelligence in Financial Accounting.

New innovations in technology is changing the ways in which individuals work in each industry. It's additionally changing the expectation of the clients and the customers working with the organizations. The equivalent is valid for financial accounting. An estimation of 70-80% time can be cut off by adding artificial intelligence into the financial activities because errors will be reduced and the time of rectification will be saved.

When accounting firms adopt artificial knowledge to their training and practices, the firm turns out to be more promising as a business and service provider along with the specialist grads and experts. AI can frequently give ongoing status of financial issues since it can deal with documents NLP and computer vision faster than ever making daily reporting possible and inexpensive. This knowledge permits organizations to be proactive and change course if the information show unusual results.

Automated authorization and handling of documents with AI tech will improve a few internal accounting processes which include data acquisition and purchasing, invoicing, buying orders, cost reports, creditor liabilities and receivables.

In accounting, there are numerous internal corporate, local, state and government regulations that must be followed. AI-empowered frameworks will help in supporting auditing and ensure compliance by having the option to screen recording.

Artificial intelligence can possibly change the finance and accounting enterprises and industries with headways that take out repetitive tasks and free human accounting experts to do more elevated level and more rewarding investigation and directing for their customers.

AI vows to help both profitability and quality of outputs allowing more prominent straightforwardness and auditability. Not just AI will give an expansive scope of conceivable outcomes and limit the standard duties of the money group however it will likewise spare time and furnish bookkeeping experts with an occasion to lead fundamental examination on different angles.

Other than that, AI will effortlessly help in forecasting accurate financial and budget statements and summaries. The centre idea is that with machine learning, financial experts would anticipate future information dependent on past information/records.

AI IN FINANCE

The finance industry has demonstrated to be an early adopter of AI compared with different enterprises. Hence, there are heaps of the utilizations of AI and ML in accounts and finance. Traders, bankers, and insurance providers could be very acquainted with these applications in some structure. Entrepreneurs, chief administrators and executive managers, who are forward-thinkers investigate new AI use in account and different territories, effectively, with the end goal of to getting a competitive edge on the market.

This part examines how AI is affecting the financial accounting service industry.

3.1 How artificial intelligence is changing the financial service industry?

During the 1980s, AI got great attention in the world of finance. The time of 90s were focusing about the discoveries and detection of fraud in finance industries. The FinCEN Artificial Intelligence System (FAIS) was one of the applications that started in 1993. It had the option to take a gander at more than 200 000 exchanges for each week.

Financial organizations have since utilized artificial neural network to recognize charges or claims outside of the standards and norms. The utilization of AI in banking can be followed back to 1987 when Security Pacific National Bank in US set-up a Fraud Prevention Task capacity to counter the unapproved utilization of debit cards. Banks are at present utilizing AI advances to maintain records, spend in stocks, and manage properties and for future analysis. AI gives a function of quickly evaluating many collections of different data. The prospective position is diminishing the overall review hazard, increment the security rate and decrease the review time. (Buchanan, B.G. 2019. Artificial intelligence in finance.)

Financial reporting organizations as of now use AI to cut their expenses on time on complicated audits and property assessments. Reviewers at Deloitte can decipher a large number of arrangements of agreements through utilizing AI assets. The projects may obtain significant definitions just as aggregate and assess hazard evaluation information and different highlights.

AI uses a few techniques to assess present data to make future pre-expressions. The AI search algorithm are used in insurance, bank, financial institutions.

AI give the managers the necessary data and information to make the correct decisions, yet those decisions are taken by an individual itself. The day will show up when the AI administration will take the decision through the program. As these methods progress, they will achieve progressively complex

251

duties. (Geisel, A. 2018. The Current and Future Impact of Artificial Intelligence on Business. International journal of scientific & technology research.)

3.2 Implementing AI in Financial Accounting

There are different factors which has added value to the area of finance by the utilization of AI. The utilization of AI in the finance area occurred in different exercises like chatbots and text answering assistant taking care of the Customer Service issues.

Table 1. Process and the implementation AI techniques in Financial Accounting

PROCESS	IMPLEMENTATION AND THE USE OF AI
Fraud detection and Risk Management	AI is being utilized to proactively screen and maintain a strategic distance from various events of distortion, illegal expense shirking, carelessness and the distinguishing proof of expected threats. As a feature of their financial assistance network, Mastercard has additionally been attempting to consolidate AI innovation in the "identification" of people frauds. Comparative procedures have been used to choose exchange wrongdoing. (Goudarzi, S., Hickok, E. & Sinha, A. 2018. AI in banking and finance.)
Credit Decisions	AI offers a snappier, more exact assessment at lower expenses of a forthcoming borrower and mirrors a more extensive scope of factors prompting a superior informed, data supported choice. AI's credit scoring depends on more complicated and progressed rules contradicted to loan scoring plans. It empowers banks to separate between high-default hazard up-and-comers and the individuals who are deserving of credit yet does not have a credit record history. Objectivity is a further favourable position of the AI framework. In spite of an individual, a machine is probably not going to be halfway. Computerized banks and advance giving applications use machine-learning calculations to examine acknowledge status for discretionary data (for example cell phone information) to check credit qualification and to offer customized alternatives. (Bachinskiy, A. 2019. The Growing Impact of AI in Financial Services)
Algorithmic Trading	Alternatively called "Computerized Trading Systems," has become a prevailing power in monetary market around the world. Algorithmic exchanges incorporates the utilization of convoluted AI frameworks to make exchanging decisions at paces of more than any individual can do and often make a large number of exchanges one day with no human obstruction. This kind of exchange is known as high-recurrence exchanging and is one of the quickest expanding monetary exchanging region. Numerous banks, value and exclusive exchanging organizations currently have complete portfolios oversaw by AI frameworks exclusively. Moreover, algorithmic exchanges and trading normally confines or diminishes exchange costs, empowering investors to maintain significantly a greater amount of their profit. At last, algorithmic exchanging limits the dangers related with feeling as opposed to the rationale that investors are known to confront.
Chatbots	Enormous Fintech organizations have a huge customer base and hence require mechanized customer administration options, for example, chatbots. These chatbots offer prompt, real time responses and reactions; practically 64% of people think AI chatbots are valuable since they convey a 24-hour administration that makes organization work safer and successful. To fulfil customers ' truly evolving requests, banks have utilized keen AI choices to give the most noteworthy conceivable client experience and to improve their openness. These conversational interfaces lead to brilliant conversations with a huge number of clients easily. As indicated by the ongoing Juniper Research study, banks presently spare around 4 mins of their agent in the treatment of a solicitation of a request through AI chatbots, sparing billions consistently in the coming years. Thus, organizations use AI choices to create an incentive in their bank offices. (Chatbot News. 2019)

IMPACT OF AI IN FINANCE SECTOR AND FINANCIAL ACCOUNTING

4.1 Impact of Artificial Intelligence on financial sector

From the outset, economic development is foreseen basically as a result of enhanced labour productivity. Computer based intelligence will likewise influence and effect occupations later on which relies upon a few elements.

Computer based intelligence and the cloud computing can calculate enormous information in a brief timeframe. This administration rearranges exercises through time investment funds, costs decrease, expanded efficiency and more exact results. Individuals in monetary area have become amazingly educated and use AI instruments to monotonously work for them with the goal that they contribute their time investigating accounts, hypothesizing about likely outcomes, taking care of the hardware and reacting if something gets off base. (MTI College, 2018. How Artificial Intelligence (AI) Impacts Accounting.)

Table 2. Impact of AI in Finance Sector Processes

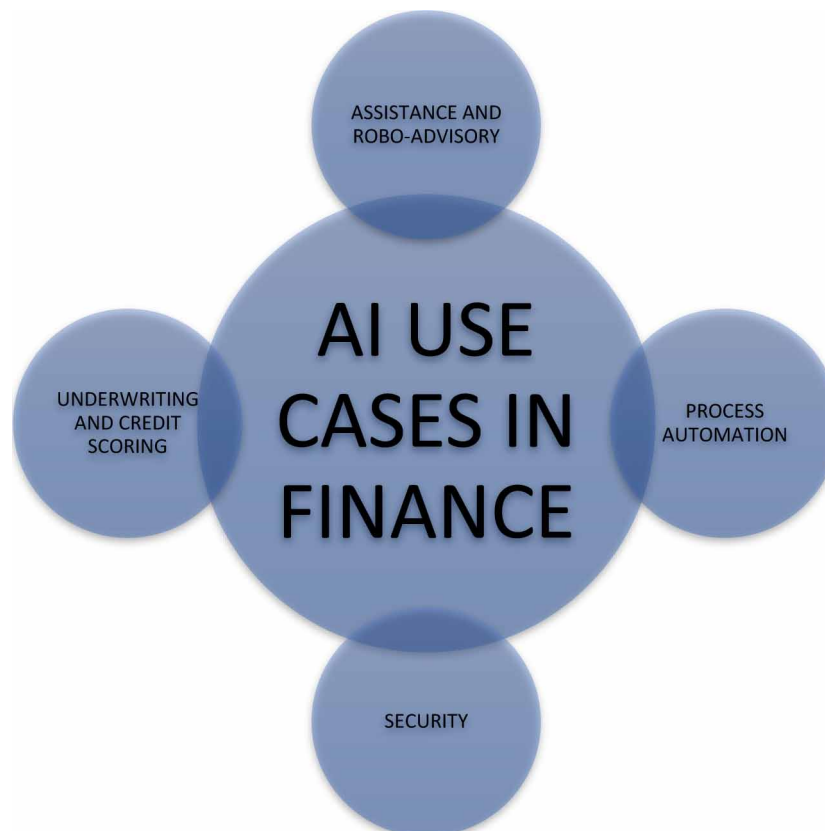| SECTOR	IMPACT OF AI
Finance jobs and functions	Workers would have to grow their expertise to qualify into work market in future. Interest for social and passionate aptitudes will develop just as numerous innovative abilities. Individuals with psychological abilities, basic reasoning, and imagination will be sought after. Occupations requiring physical and manual capacities will decrease throughout the long term. At last expertise moving later on could mean overflow interest and gracefully in certain aptitudes creating lopsided equilibrium. Likewise workplace may change for instance clerk could go from dealing with product to address questions and investigate machines as self-checkouts are acquainted with stores. As these changes arise numerous nations face aptitude deficiency and instructive frameworks are tested just as increasing expenses for preparing workers for progress. At last numerous nations have just been encountering these issues and it shows in pay disparity and polarization. (Plaschke, F., Seth, I. & Whiteman, R. 2018. Bots, algorithms, and the future of the finance function.)
Credit analysis and management	In the assisted intelligence stage, In the AI assists to identify data trends and relationships to reflect potential debtors' credit limit. With augmented intelligence, trend identification methods are enhanced to predict potential changes to debtors' credit limit. In the autonomous intelligence stage, AI intends to wipe out human intervention by effectively scouring the web for information, investigate and offer experiences, for example, the ideal credit limit for customers by anticipating their capacity to pay, order preparing and invoicing. With augmented intelligence, inconsistencies in invoicing, for example, an anomalies in invoicing such as suspicious amount of order or purchase by customers can be identified and taken care of.
Banking	With assisted insight capacities, AI assists with recognizing inward data patterns and connections between the association and market climate that may bring about unfamiliar trade or loan fee transition.
Tax Authorities	In the assisted intelligence stage, AI upholds human assignments by empowering the examining of use things and extraction of key data for legitimate grouping of records. Such abilities likewise encourage the filtering of GL and finance records to decide the fittingness of finance charge. At long last, with independent insight, AI changes the cycle by helping people in tax filling through identification of at-risk transactions, grouping, and applicability of tax treaties.

FUTURE ASPECTS AND CONCLUSION

5.1 Future Aspects

Till this stage, people have moulded AI innovations to fulfil human requirements. Its undertakings were extremely specific: predictive financial patterns, banking, taxation and so on. AI offers similarly as we have become web dependent for correspondence, studies and occupations. AI would in the end pull from people the reins of its own fate, and it will have transcended its producers in numerous regards as of now. Thusly, would have come the period of artificial super-intelligence.

To sum up, it is discovered that there is no other business area that is as centred as the financial industry around creating and actualizing AI for speed, precision, and proficiency. AI will be significant to changing and moulding the future of work and efficiency, and there is a gigantic chance. The current rush of AI-based applications promises to be the greatest and most boundless innovative change found in the prior occasions.

Any business can utilize AI applications for financial and accounting decisions. It will be essential for organizations and community in general to figure out how to utilize the most recent innovation and make changes. To remain competitive, organizations should coordinate and integrate AI and workers.

Figure 2. AI Use Cases in Finance
(Compiled by the author)

5.2 Conclusion

This report was pointed toward analysing the impact of AI on current world, especially in the field of financial accounting sector. This report was additionally pointed toward distinguishing the utilization of AI, its challenges and opportunities. The report also emphases the recommendation for financial sector adopting AI.

As a result of the research, it is discovered that AI is moving over a huge front. Despite industry, AI offers financial organizations to grow and prosper over their value chains, through critical changes going from traditional procedures to integrated industry-practice. Various sorts of AI applications are utilized by organizations in their day by day activities. This study additionally shows that individuals with cognitive abilities and critical thinking will be in demand.

Artificial intelligence's points of interest stay to create, guaranteeing the innovation will be with us here. It will be fundamental for organizations and network in general to figure out how to utilize the most recent innovation and make changes. To remain competitive, organizations should coordinate AI, and workers may have to change their range of abilities to look after positions.

In my view, AI execution is and will emphatically affect financial function efficiency. With the valuable impact of AI, numerous dynamic jobs will be taken over by smart frameworks from people in the coming years. Nonetheless, I believe that data and information security will be perhaps the greatest test AI could confront. Usage of AI can support worldwide economy and success.

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Chapter 18
Human Leaders and Artificial Intelligent Leaders:
Workplace Spouses

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ABSTRACT

The chapter deals with the relationship between human leader and artificial leader. Organizations are encroached by artificial intelligent in almost all the areas of the organization such as retail industry, banking industry, call centers, manufacturing industry. The chapter shows the path how human leader sharing workplace space with the artificial leaders and make them as their workplace spouses for the better functioning of the organizations and the economy. The limitation of the research is implementation of AI in organizations will generate social problems such as unemployment, theft, etc. The future scope of the research is to analyze the working of artificial leaders in the academic industry.

INTRODUCTION

Human beings have evolved from apelike primates to an intelligent species who is able to handle the cognitive dissonance and emotional dissonance simultaneously. Since ages, we are accustomed with the culture of working under leadership, be it Kingship, democratic style, autocratic style or laissez faire etc. The term leadership was occurred only since 1700s (Stogdill, 1974). The scientific research on the leadership did not get underway until the twentieth century (Bass, 1981). According to Robbins, S. P., & Judge, T. A. (2013), Leadership is described as "The ability to change a group in relation to the attainment of goals". The concept of leadership is evolving with each passing day. Now a days, leaders are actively involved with their teams, projects, enterprises and the overall systems for the growth of the organizations.

With the emergence of new decade namely, 21st century, human intelligence has created Artificial Intelligence for the successful functioning and achieving goals for the organization with optimum resources. The introduction of Artificial intelligence, machine learning, block chain technologies, 3 D printing and neural networks and sentiment analysis etc. the style of leadership is changing with the transformation of changes in the culture of the organizations. The culture of organization changes from stable organization to the VUCA organizations. The term VUCA stands to illustrate or to indicate on the volatility, uncertainty, complexity and ambiguity of general conditions and circumstances in the organizations.

The role of AI leadership should be imbibed in different sector with the help of web of three components such as leadership, culture and technology. The three components should be blended and taken care in the organizations which is represented as follows:

Figure 1. Web of leadership, culture and technology
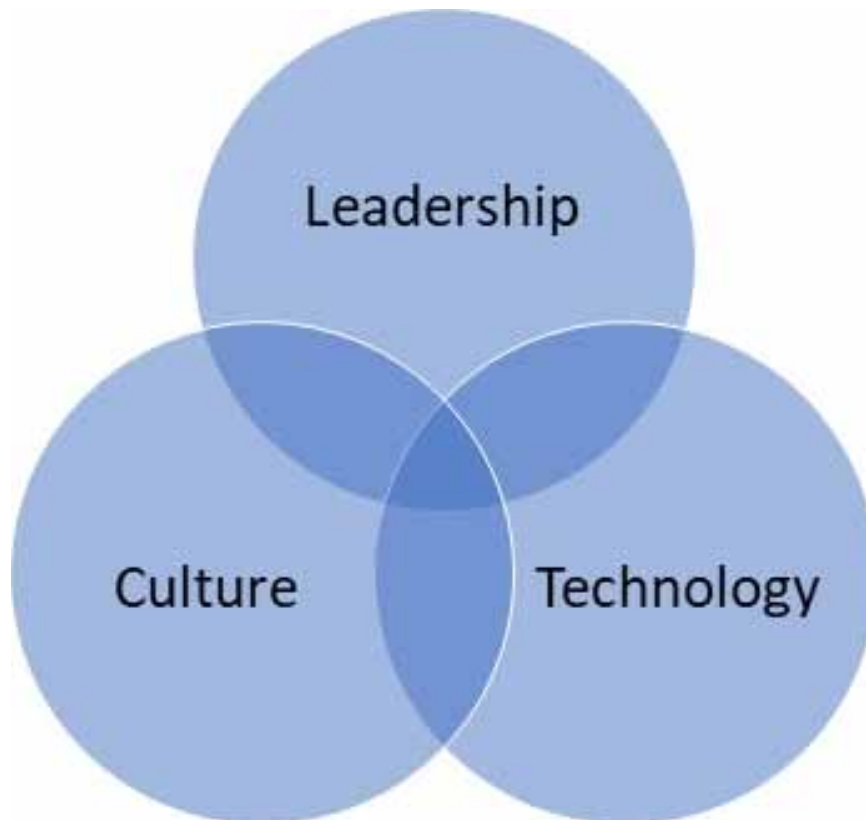
So, in the disrupted world, where seismic cultural change, need for empowerment, equality and organizational ethics needs to be maintained by the leader. Leader should take care of climate change, inequality, and depression among the team members of the organizations. Leader should strike a balance between technological changes, cultural requirements and the styles of leadership.

LEADERS IN 21ST CENTURY

Dall'Acqua, L. (2021) proposes a theoretical contribution in the domain of artificial intelligence.

It provides a pathway for leaders to manage responsibilities and improve performance. The intended approach understands the fluid nature of the decision-making process seem to be at knowledge activities as self-regulative, dynamic, and adaptive based not only on well-known explicit curricular goals but also on unpredictable interactions and relationships between players. The knowledge process is evolving in human, cultural, biological, social environments. Bleich, M. R. (2021) indicated that leaders must educate in technology for building a cluster of competencies that mark a rapidly emerging future. Wang, X., et. al., (2021) expounded the impact of leadership and human resource capacities on smart education and findings proved the positive significant influence on smart education. Titareva, T. (2021) assess to merge the two concepts "leadership" and "artificial intelligence" by highlighting the main perspectives in the research field of Leadership in Industry 4.0, dominated by Artificial Intelligence based technologies. Höddinghaus, et.al., (2021) suggested that higher levels of integrity and transparency could be received through automated leadership agents. Whereas Human leadership agents are alleged kinder and more pliable. The alleged trustworthiness of human and automated leadership agents regulates trust. Wang, Y. (2021) explore the role of AI in educational leadership via interdisciplines such as computer science, educational leadership, administrative science, judgment and decision-making and neuroscience. The major findings are AI-assisted data-driven decision-making may run against value-based moral decision-making. Leaders' individual decision-making and organizational decision-making are best managed by using a combination of data-driven, evidence-informed decision-making and value-based moral decision-making. AI can act as an extensive brain in making data-driven, evidence-informed decisions. The weaknesses of AI-assisted data-driven decision-making can be affected by human judgment conducted by moral values.

Moreover, author have heard about democratic style of leader, autocratic leader, laisses faire. But to cope with the acceleration trap of change, leadership should be dynamic in its nature. For the organization, the concept of leader should be divided into two parts:

1. Human Leaders
2. Artificial Leaders

Human Leaders: Those leaders who have feelings, emotions, empathy, have human brains and dealing with the most important decisions of the organization which are represented below:

a. **Strategic Planning:** To survive in the competitive environment, organization needs strategic planning. To make and create strategic plans, organizations need leaders who have the ability to think, create new plans. Now a days, in the technology driven environment, to plan a strategy. Leader should be well versed or in the inclination with the technology and strategy for the better functioning of the organization which further help in achieving organization goals.

b. **Creativity:** Innovation and creativity is the key for the good leadership. Creative leaders are the backbone of the organizations and have the ability to analyse the problems into new ways of solving it. Human Leader are good creator, it creates an environment of competitiveness and helps the organization to establish itself as an Employer brand in which it helps the prospective candidates to apply in the organization and have a good pool of talent for filling the manpower gap in the organizations. It also helps

the organization to retain its employees which further facilitates to reduce the training and development cost and enhance the profit for the organizations.

c. **Intuition:** Intuitive leader can see and understand the functioning of the organization by observing and listening. This quality of humans gave an added advantage to make sound decisions for the welfare of the organizations. Intuitive Leadership is the boon for the organization which is not visible in the artificial leader.

d. **Communication:** Communication is defined as the two-way process of telling the information and then analyzing the other party's point of view. This two-way process can be fulfilled with the effective human leaders only. Based on sharing the information, human leader can analyze and take the decisions as they have the power of understanding the hidden information also in the communication pattern. Hidden information such as the dialect, idioms, tones of sender and understanding of receiver etc. In India, we have more than 256 languages and dialects. One sentence can have different connotations and different meanings. So, it is easier and more understandable for the human leaders to take decisions for the organizations.

e. **Empathy:** Leader should have the trait of empathy among their teams which is lacking in Artificial leaders. So, human leaders are the effective empathetic people to understand and evaluate the needs of human being time and again. Incase some employee is going through some sort of depression, then no artificial leader till the time has the competency to identify the same and provide the solution for that person. To understand the psychology of the humans, organization need Human leader. Further an environment of understanding can be only created by the human leaders only.

f. **Human Wisdom:** Wisdom is the most efficient trait for running the business organization successfully. For the organization, humans are the biggest asset who have the wisdom to handle the organization profitably. Leader who is having knowledge, understanding and intelligence. Moreover, the leader who learn from their experience is only relatable traits in the human beings. So, wisdom is inevitable for operating the business at all levels in the organizations.

*Figure 2. Characteristics of human leaders*

260

Artificial Leaders: Those leaders who do not having feelings, emotions and empathy and use artificial brains for the decisions required to be taken in the organization. They just follow the instructions given by the humans and now the concept of machine learning is a buzzing concept which is booming in the ears of everyone from all the directions. Following are the main characteristics of artificial leader (AL) which are represented below:

a. **Data:** In the digital era, organizations are surviving in the competition on the basis of extraction of information from the analysis of data and frame the strategy to accomplish the mission of the organization. To compute large number of data, organizations can take the help of artificial intelligent leaders for saving the time and accurate results which further helps the organizations to frame strategi to combat the competition and establish as a brand for itself.

b. **Lean Management:** It deals with the concept of creating value to the customers by utilizing optimum resources. AI can play the major role in reducing the wastage and increasing the efficiency of organizations. Now a days every organization is engaged in the process of Lean management and following the process of 3R namely, reuse, reduce, and recycle which further help the natural environment also to flourish.

c. **Productivity:** The productivity can be increased when the organizations are able to successfully implement AI in terms of Robots as they did not feel stress, fatigue and soon. Humans have feelings, emotions and they required physical strength for accomplishing the tasks. But AI did not have feelings, emotions and they have a lot of strength to perform all the tasks.

Figure 3. Characteristics of artificial leaders
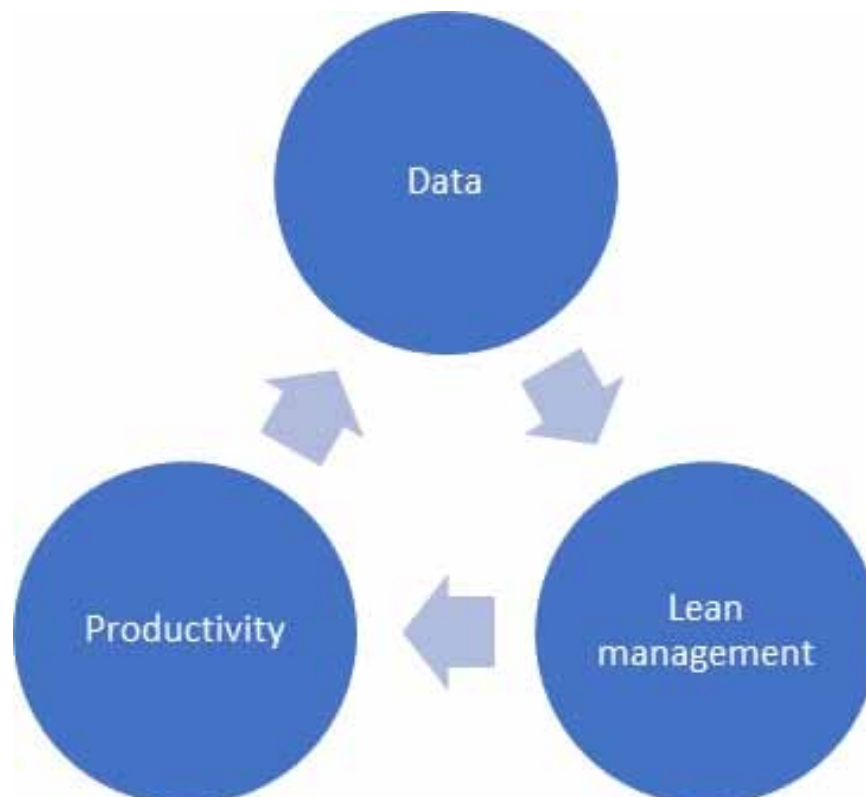
The roles and responsibilities of both the leader should be remarkably well communicated in advanced as they must play different roles in the same environment. So, there would not be any clashes in between the functioning of job of leaders. As the environment is changing exponentially and moving from human driven to technology driven. At the times of Industry 1.0 all the work has been located by the humans and accomplish by the humans only. But now, at the time of Industry 5.0, the work has been shared with the machines for the better results.

Role of AI Leader in Different Industry: The role of AI in different industry has been explained below for the better understanding of the usage of AI in all the industries:

1. **AI Leader in Manufacturing Industry:** It is defined as the production of goods through use of labour, machines, tools, and chemicals. Organizations can use AI leader in the manufacturing industry. For example: Maruti Suzuki, Gurugram

2. **AI Leader in Retail Industry:** Organizations have changed their minds in the field of retail marketing by introducing AI and machine learning for the use of price predictions, voice search, chatbots to assist with customer service, price adjustments etc.

3. **AI Leader in Banking Industry:** AI driven automation, banking sector are leveraging machine capabilities to enhance operations, scale and cut costs. AI can be used in banking industry for handling customer query of loan, ATM card, Debit card and Credit card. Also, verifying property documents, assist in loans and helps bankers for analyzing the officers in documentations.

4. **AI Leader in Call Centers Industry:** The booming industry now a days is call center which is a centralized office used for receiving and transmitting many calls by telephone for the overall satisfaction of customers related to product, services, emergency calls, market research etc. For handling the phone calls, we can use AI for the better results.

5. **AI Leader in Healthcare:** In 2021, where the whole world is suffering from Covid-19, it is very important to use AI in different healthcare gadgets which helps the medical practitioners to take the decisions rapidly and accurately. Now a days a lot od devices are available in the market which easily monitored various things such as, BP, level of sugar, sleeping patters and calories count. Medical practitioners with the help of these kind of monitored devices can take the decisions with more accuracy and timely action can be taken to save the life of the individuals', the role of AI can be very much beneficial in saving the human race.

6. **AI Leader in Automobile:** Automobile industry is changing drastically by taking the help of AI in maintaining the car, trucks, and other vehicles. Not only in maintenance of the vehicles, but organizations have also developed the auto pilot car, rechargeable cars etc. which shows a new path of development for the humans.

7. **AI Leader in Social Media:** People are tied with social media for entertainment, shopping, information gathering etc. On the online websites, they automatically pop up with the new suggestions of your choice in all the facets such as movies, cloths, gadgets etc. So, artificial intelligent (AI) is playing a significant role in saving the time in searching the options for their choices.

8. **AI Leader in Gaming/ Entertainment:** A lot of gaming app are available in the market which helps the humans to play with such as, Ludo, Chess, Minesweeper etc. Apart from the above mentioned there are other games also available which are known as virtual reality such as PS3, PS4 etc. virtual reality helps the human in proper engagement as they are playing with humans only. Moreover, when we are playing with the machines it gives a sense of satisfaction when you won. It seems like you are more intelligent than Artificial intelligent.

9. **AI Leader in Agriculture:** Indian economy is based primarily on agriculture. To improve the quality of crops, soil we can use agriculture robots which helps the farmer to monitor their quality. Predictive analysis can also be used to estimate the growth of crops and accordingly export and import decisions can be taken which further helps the economic conditions of farmers as well as the country. Moreover, drones can also be used for monitoring the insects, bird attack and so on.

CONCLUSION

The need of hour is to create a ***"niche of success"*** for the organization which can be possible only when there is a blend of human leader and artificial leader to work as spouses at workplace. Workplace spouses is defined as the employees who are complementing each other in every aspect of work. In this research study, workplace spouse are human leaders and artificial leaders. Human leaders will take care of creativity, innovation, feeling and beliefs and Artificial leader will take care of monotonous tasks such as customer service, working on machine etc. When both the workplace spouses work together in all the above-mentioned industries such as agriculture, social media industry, retail industry, banking industry, call centers industry, automobiles industry, manufacturing industry, gaming/ entertainment industry, and healthcare industry etc. The work which creates fatigue and have redundancy features can be easily allocated to the AI leaders. After that, human leaders can process and predict some strategies on the basis of the input provided by AI to HI for achieving a good balance within the organizational environment. Based on the input received from the AI, humans can process and provide a feasible output to the organizations. To balance the organizational need in terms of analyzing data, creating, and implementing new strategies workplace spouses is considered as the best solution for the organizational leadership.

LIMITATIONS AND FUTURE SCOPE OF RESEARCH

In the country like India, we have ample number of human employees as India is the second most populous country in the world. Implementation of AI can create unemployment, increase rate of crime and dissatisfaction among country people. AI Machine cannot innovate and create so we need Human Beings for the betterment of the organizations. AI leaders were implemented in different sectors such as retail, banking, call centres and manufacturing, Researchers can explore other sectors such as Academics/teaching for the future scope of research.

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Chapter 19
Managing Human Resources in the Artificial Intelligence Era

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ABSTRACT

Man-made reasoning's (AI) coordination into HR practices will improve associations in light of the fact that these applications can dissect, anticipate, and analyze to help HR groups settle on better choices. Computer-based intelligence can be inserted in capacities like enlistment, preparing, onboarding, execution investigation, maintenance, and so forth. A large part of associations are as yet slacking in coordinating AI to their HR practices due to cost. Man-made intelligence execution ought to be seen as an idealistic chance, since AI improves lives. Computer-based intelligence makes a superior future in case it is plainly perceived and used in an appropriate manner. Hence, this chapter gives a description about artificial intelligence and its history, its importance in every arena of the society, and the use of AI in human resources management.

INTRODUCTION

AI is a new advancement of the technology that gives permission to computers for taking an appropriate action on the behalf of previous data collection. Man-made brainpower is the recreation of human insight measures by machines, particularly PC frameworks. Explicit uses of AI incorporate master frameworks, regular language handling, discourse acknowledgment and machine vision.

How Does AI function?

As the publicity around AI has sped up, sellers have been scrambling to advance how their items and administrations use AI. Regularly what they allude to as AI is essentially one segment of AI, for example, AI. Artificial intelligence requires an establishment of particular equipment and programming for composing and preparing AI calculations. Nobody programming language is inseparable from AI, yet a couple, including Python, R and Java, are famous. As a rule, AI frameworks work by ingesting a lot of named preparing information, breaking down the information for relationships and examples, and utilizing these examples to make forecasts about future states. Thus, a chatbot that is taken care of instances of text talks can figure out how to deliver exact trades with individuals, or a picture acknowledgment instrument can figure out how to distinguish and portray protests in pictures by surveying a large number of models. Artificial intelligence programming centers around three psychological abilities: getting the hang of, thinking and self-remedy. Learning measures. This part of AI programming centers around obtaining information and making rules for how to transform the information into significant data. The guidelines, which are called calculations, furnish figuring gadgets with bit by bit directions for how to finish a particular job.

For what reason is man-made brainpower significant?

Computer based intelligence is significant in light of the fact that it can give ventures bits of knowledge into their activities that they might not have known about already and in light of the fact that, now and again, AI can perform assignments better than people. Especially with regards to tedious, conscientious undertakings like examining huge quantities of authoritative archives to guarantee pertinent fields are filled in appropriately, AI instruments regularly complete positions rapidly and with somewhat a couple of mistakes.

This has helped fuel a blast in effectiveness and made the way for totally new business openings for some bigger undertakings. Before the current flood of AI, it would have been difficult to envision utilizing PC programming to associate riders to taxis, yet today Uber has gotten probably the biggest organization on the planet by doing exactly that. It uses modern AI calculations to anticipate when individuals are probably going to require rides in specific regions, which helps proactively get drivers out and about before they're required. As another model, Google has become perhaps the biggest player for a scope of online administrations by utilizing AI to see how individuals utilize their administrations and afterward further developing them. In 2017, the organization's CEO, Sundar Pichai, articulated that Google would work as an "Artificial intelligence first" organization. The present biggest and best endeavors have utilized AI to work on their tasks and gain advantage on their rivals.

What are the benefits and burdens of man-made reasoning?

Counterfeit neural organizations and profound learning man-made brainpower advances are rapidly developing, essentially on the grounds that AI measures a lot of information a lot quicker and makes expectations more precisely than humanly conceivable. While the enormous volume of information being made consistently would cover a human specialist, AI applications that utilize AI can take that information and rapidly transform it into significant data. As of this composition, the essential detriment of utilizing AI is that it is costly to deal with the a lot of information that AI programming requires.

Benefits

1. Great at conscientious positions.
2. Decreased time for information hefty errands.
3. Conveys steady outcomes.
4. Man-made intelligence fueled virtual specialists are consistently accessible.

Drawbacks

1. Costly.
2. Requires profound specialized mastery.
3. Restricted stock of qualified laborers to assemble AI devices.
4. Just realize what it's been shown.
5. Absence of capacity to sum up starting with one errand then onto the next.

Meaning of AI

AI is the recreation of human knowledge measures by machines, particularly PC frameworks. Explicit utilizations of AI incorporate master frameworks, regular language preparing, discourse acknowledgment and machine vision.(Placeholder1

History of AI

Man-made brainpower (AI) is certainly not a new innovation. For quite a long time, PC researchers have attempted various ways to arrive at the sacred goal of figuring: intelligent machines. However, researchers are still not reaching the point where they can replace machines with the human brain, Computer based intelligence applications have begun to fill our everyday lives and force our electronic gadgets, from cell phones to home alert frameworks. (Eva, 2017)

The Way to Present Day AI

The first tool, invented about 5,000 to 6,000 years ago to help people make calculations easy, was Abacus as it is still used in schools by children to visualize the problems of mathematics. it doesn't actually save us from the work of really performing them. We needed to sit tight until the 1960s for the main machines that could add and deduct numbers naturally. PCs have made some amazing progress from that point forward, yet where it counts their capacity has still been quite straightforward: executing computations precisely as a few (master) humans have trained them to do. There's little "knowledge" in them.

The two words fake and knowledge were first assembled on August 31, 1955, when teacher John McCarthy from Dartmouth College, along with M.L Minsky from Harvard University, N. Rochester from IBM, and C. E. Shannon from Bell Telephone Laboratories, requested that the Rockefeller Foundation store a late spring of exploration on man-made consciousness. Their proposition expressed the accompanying:

We suggest that a multi month, 10 man investigation of computerized reasoning be completed throughout the late spring of 1956 at Dartmouth College in Hanover, New Hampshire. An endeavor will be made to discover how to make machines use language, structure deliberations and ideas, tackle sorts of issues currently saved for people, and work on themselves. We feel that a critical development can be made in at least one of these issues if a painstakingly chosen gathering of researchers work on it together for a mid year.

The scientists realized that handling knowledge all in all was excessively extreme of a test, both due to specialized limits and the innate intricacy of the errand. Rather than settling the wide idea of insight, they chose to zero in on sub problems, similar to language. Afterward, these applications would be called restricted AI . A man-made brainpower equipped for coordinating or outperforming human abilities would rather be called general AI. All in all:

General AI (or solid AI): A man-made reasoning system equipped for handling each sort of undertaking it's introduced. This is like a very ingenious human, and you can consider it the robot from The Terminator (or, ideally, a more quiet form of it).

Narrow AI: A man-made brainpower program equipped for settling a solitary, obvious undertaking. It tends to be wide (perceiving objects from pictures) or very explicit (anticipating which clients who purchased item A are bound to buy item B too). This implies each errand in turn, and no other: an AI that perceives felines in pictures can't make an interpretation of English to Italian, and the other way around. After the hard work of a few years, an infamous 1966 Automatic Learning Processing Advisory Committee (ALPAC) report had been produced by the government. This report gave the views of AI given by many researchers about the state of AI, in which most were not in favor of this as they were not having positive views regarding this.

The ALPAC report denotes the start of a period called the principal AI winter: public financing for AI research halted, energy cooled, and analysts zeroed in their work on different fields.

Premium in AI blurred until the 1980s, when privately owned businesses, for example, IBM and Xerox began putting resources into another AI spring. New expectations were energized by an innovation called master frameworks: PC programs that encode the information on a human master in a specific field as exact, assuming guidelines. A model will assist you with seeing how master frameworks were intended to function.

Assume you need to fabricate an AI framework that can sub for a gastroenterologist. This is the means by which you do it with a specialist framework: you request that a specialist depict with outrageous accuracy how they settle on choices about patients. You then, at that point, ask a developer to carefully change the specialist's information and conclusion stream to assuming standards that can be perceived and executed by a PC. An incredibly worked on variant would look something like this:

On the off chance that the patient has a stomachache and the internal heat level is high, the patient has seasonal influenza.

On the off chance that the patient has a stomachache and has eaten lapsed food, the patient has food contamination.

Etc. When the specialist's information is encoded into the product and a patient comes in, the product follows a similar choice way as the specialist and (ideally) concocts a similar determination.

AI belongs to a discipline of computer science, whose main focus is to solve the difficult and crucial problems that we can relate with the intelligence of humans. In simple words, AI assembles machines to "act like humans" and do work for memorizing, problem solving and reasoning, aptitude problems and

for the processing of a language. Presently, AI is based on two fundamental technologies i.e. machine learning and deep learning. (Biswas, 2021)

What is Machine Learning?

Machine learning is a subdivided part of artificial intelligence that allows machines to gain knowledge and make predictions based upon the previous data stored in them. The underlying foundations of AI are inserted in design acknowledgment and the idea that calculations can gain from recorded information without being customized to do as such. For example, a calculation that necessitates recognizing vehicles will depend on pictures of different vehicles to show itself what resembles a vehicle. For this situation, the end objective of the calculation has been characterized – which is to distinguish a vehicle; however the means to show up at the goal is learned by the actual machine via preparing information.

What is Deep Learning?

Deep learning is a part of AI that prepares a PC to gain from a lot of information through neural organization design. It is a further developed type of AI that separates information into layers of deliberation. Rather than getting sorted out information to go through predefined conditions, profound learning sets up essential boundaries about the information and trains the PC to learn all alone by perceiving designs utilizing numerous neural organization layers for preparing (like neurons in the mind).

Considering a similar vehicle similarity from a higher place, a profound learning calculation can recognize a vehicle and a truck by distinguishing the connections between center components of a vehicle and a truck (vehicle – 4 wheels, no stacking bed; truck – at least 4 wheels, has a stacking bed, and so on) therefore, after adequate preparing, profound learning calculations can start to make expectations or translations of extremely complex information. (Meyer, 2018)

LITERATURE REVIEW

In 2018, Amazon found that its calculation for employing had precisely this issue for precisely this explanation, and the organization brought it down accordingly (Meyer, 2018). Indeed at the point when the sex of candidates was not utilized as a standard, credits related with ladies up-and-comers, for example, courses in "Ladies' Studies" made them be precluded. [3]

A first issue is the intricacy of HR results, like what comprises being a "great worker." There are numerous measurements to that build, and estimating it with exactness for most positions is very troublesome: execution examination scores, the most broadly utilized measurement, have been completely censured for issues of legitimacy also, dependability just as for inclination, and numerous businesses are surrendering them by and large (Cappelli and Tavis 2017).

Barbara van pay (sep 30, 2018), in this article how AI is reinventing HR it was clearly stated that all the organizations mostly looking for AI solutions for their business and they are scared of letting a non human entity handle the procedures of business. By using the AI in organization it can reduce the time consumed for filling and hiring the candidates who applied for the job, through screening multiple candidates, gathers data they rank the candidates by considering other information like experience, skill set etc., to find right person. After finding the perfect fit for the role next main part is interviewing, now

adays AI interviewing softwares such as hike vue, mya are used mostly. AI technology takes care from sourcing to interview which drastically reduces the recruitment timeline and help to hire right candidates with ability to perform in specific roles and make placements much easier and at faster rate.

Eva wislow(2017) led an examination on the title of top approaches to utilize AI in HR it was obviously expressed that AI is reshaping the way that organizations deal with their work power and make the arrangements which expands usefulness and representative commitment overall. Ability securing is fundamental significant thing, we can eliminate huge loads of distressing and dreary work from hr administrators specifically ability obtaining programming can sweep, peruse and assess candidates and rapidly takes out 75% of them from the enlisting cycle .AI can design, coordinate and can give so many preparing projects to the recently joined representatives through online courses and computerized class rooms. Artificial intelligence can predicts the prerequisites of workers then maintenance will be more for the representatives in the association it assumes a vital part in the association since work is impossible physically so with the assistance of man-made brainpower the work will be done without any problem (Wislow, October 24th, 2017.)

As per the research of Edge Admin(2017), the current world is dominated by the cutting edge innovations, which is scaring the worldwide labor force. Out of the relative multitude of advancements, we can say AI is the most momentous one. As significance in the use of AI practically in each what's more, every area may it bank, medical care protection and so on, yet the outcomes accomplished are amazing. AS the greater part of the organizations across the globe are embracing AI, India is additionally not a special case that new firms especially(start-up's) are currently incorporating their business with AI to remain more apparent and to be serious. A portion of the beginning up's that have incorporated its business with AI in India are: ARYA.ai, BOXX.ai, cuddle.ai, Imbibe, Edgenetworks, and Haptik to give some examples. (Admin, 2017)

AI IN HRM

In the bygone era, no one can imagine AI as reality. Everyone thought about it as a product of the science fiction world. However, nowadays, each and every profession is using AI as a crucial part at their workplace. No one can imagine their office work without the application and appliances of AI. So, how can human resource carriers be lacking in this race?

Oracle and Future Workplace conducted a survey to know what HR professionals think about AI as AI provides more benefits to Hr professionals for enhancing new ideas, knowledge and skills. Moreover, it gives them more time to get high exposure in their present duties and responsibilities in order to acquire more positive results for them and their organizations. However, the results are totally unexpected as 81% managers said that it is quite difficult for them to cope up with the new technological changes at their workplace. Hence, nowadays, it is necessary for every HR employee to get complete knowledge about AI for the betterment of their organization as compared with past times.

Evolution of Artificial Intelligence Research in Human Resources

Concerning the HR area, this has been quite possibly the most affected by recent fads and is going through a significant change in repositioning terms and their new job inside organizations. Human Resource Management (HRM) has become an essential pattern in associations. (Barreto, 2011) HRM has been

developing, driven by monetary, political, social and for the most part mechanical changes, just as by the requests of intensity and functional greatness. (Cançado, 2017) Comprehend that the Human Resources Management (HRM) system is worried about work strategies and rehearses, which incorporates enrollment, choice, assessment, improvement and maintenance of representatives, just as enlistment, counsel and exchange with people. (Boxall, 2011). The mix of HR and business procedures is established by portrayal of HRM's at the association's undeniable degree of dynamic. (Brewster, 1994) In this way, the more prominent the validity of data, the more emphatic the dynamic will be. In this specific circumstance, AI comes as an arrangement of outrageous significance, going about as an ally and utilizing the viability of the Human Resources (HR) region.

More prominent insight, from bid and recruiting, to onboarding and progressing work the HR use cases for AI are many. We're continually discovering new freedoms to make everything from enlisting, preparing, and onboarding, to representative input and execution the board better with AI. What follows is a more intensive glance at four center regions where AI is having the main effect. (dawson, 2021)

Screening: Accurate and Productive Resume Separating

The capacity for contenders to apply to most positions carefully has been a distinct advantage. Simply contemplate the single click "simple apply" work on LinkedIn. Applying to occupations is simpler than any time in recent memory. The sheer number of utilizations per work post makes some type of resume computerization an absolute necessity. (Devesh Kumar Srivastava)

Regardless of whether you don't get 3,000,000 requests for employment a year, similar to Google does, your HR staff could probably profit with an AI-fueled resume calculation. These calculations can examine a high volume of resumes like a flash, scoring and tiering them as per predefined standards. For instance, look at how Ideal aides HR groups screen productively while lessening predisposition, with the utilization of AI. (K. M. Suceendran, 2015)

Computer based intelligence can likewise coordinate with data on a competitor's resume to important employment opportunities, shortening the chance to apply and, where proper, sifting through candidates that wouldn't be a solid match. By taking on the regularly tedious assignment of checking resumes, AI can let loose HR staff to zero in on higher-esteem tasks. It can make the existence of your candidates simpler too via consequently filling in structures with data it as of now has on record.

Reasonableness: A Fair Ability and Representative Lifecycle

Lamentably, individuals are inclined to what IBM calls "oblivious predisposition." This is particularly obvious enrolling and employing, execution checking, and even remuneration. As per an IBM Smarter Workforce Institution report, the predominance of oblivious inclination can seriously hinder variety and consideration drives. This predisposition can likewise be decreased—or possibly relieved—with the assistance of AI, something HR experts should be very keen on. For instance: Better robotized work proposals so a more extensive, more assorted ability pool is made mindful of a vacant position that suits them. Dazzle candidate screening that consequently eliminates identifiers from a resume that may make oblivious predisposition during the resume screening and positioning cycle. Robotized profession way and open job coordinating with that improve interior versatility, professional success, and advancement openings by finding matches that people may neglect.

Efficiency: The Advancement of HR Occupations

HR occupations are not disappearing, just developing. Expecting an enrollment specialist, for instance, can defeat the mechanical expectation to learn and adapt, they may find that AI-fueled apparatuses fill their heart with joy to-day experience undeniably more effectively. A Chief People Officer managing a variety, value, and consideration (DEI) program may find that they presently have the opportunity and data they need to make their cycles for advancement and end undeniably more fair. Indeed, Ideal's DEI item can give information and bits of knowledge to assist with moving enormous scope DEI drives forward. Overall, AI is less regularly supplanting HR occupations, but instead computerizing the everyday assignments that in the past kept HR experts down.

Apparatuses: Another Variety of HR Programming

Any discussion of AI in HR asks two inquiries; the first being 'Is HR prepared for further developed tech?' The short answer is indeed, the utilization of cutting edge tech and AI in HR is as of now here. The following inquiry is, "what will it really resemble on an everyday premise?" Quite regularly, the force of AI is installed inside the applications that HR as of now utilizes consistently to settle on better choices and backing workers. These may be customary HR the board frameworks, or more far reaching, cloud-based with numerous AI-fueled capacities.

Artificial Intelligence for Human Resources Problems

There are some HR risks that always have to keep in mind, which are as follow:

1. **The Social Dialog**

   A disappointment in the administration of social discourse following an absence of correspondence or exactness of administrative targets can create solid strains inside the organization: delayed strike (non-attendance, demotivation, absence of trust among chiefs and representatives).
   Predict: Strike Extra/Absenteeism Rate. (Porter, 2016).

2. **Skills Management**

   An absence of follow-up of the abilities and gifts of the organization efficiently prompts a highlighted takeoff of key workers of the organization: expanded demotivation of staff, absence of preparing, and stagnation of groups. (Rahul Yedida, 2018) steady loss rate/helped mindfulness rate. (B., 2013)

3. **Prosperity and Motivation at Work**

   Some administrative practices, for example, the laying out of unreachable objectives and the absence of correspondence among supervisors and representatives can be considered as a trigger for pressure, wear out or even selfdestruction of workers. (Jessica Frierson, 2018)
   Predict: Staff Satisfaction/Staff Involvement.

4.   **Employee Safety**

An absence of formalization of security techniques and the shortfall of inward control in this space might lead the organization to conceivable common and/or criminal punishments following wounds or even passings in the working environment (debasement of his picture).

Anticipate: Operational dangers identified with the movement of the organization. (Alexander, 2003)

5.   **"Malignant" HR Practices**

A disastrous social environment might be the consequence of an unsensitized executive framework dependent on unreasonable tension with respect to the executives (tension on targets) and absence of control of administrative rehearsals inside (provocation of staff, inconsistent treatment of circumstances).

Predict: Indicators to evaluate the social environment. (JY Saulquin, 2007)

6.   **HR Costs**

An absence of control of HR expenses may prompt extra expenses and an underlying expansion in administration costs, particularly without the executives and HR the board control: helpless administration of finance, cost health care coverage/opportune protection. Foresee: Indicators to control HR costs and upgraded HR the board control. (H Savall, 2010)

THE GROWING ROLE OF ARTIFICIAL INTELLIGENCE IN HUMAN RESOURCE

Use of Artificial Intelligence (AI) in Human Resource (HR)

In early days essential obligations of human assets were recording, upkeep and finance. Over the long run different capacities, for example, representative preparation, consistency and prosperity were added to their undertaking Later on enrollment and talented labor force determination were added to their obligations. Today, Human Resource Management (HRM) is assuming a more basic job than any other time in recent memory. (Saxena, 2020) Nowadays, not simply that they are answerable for all errands referenced, yet they are additionally liable for persuading the representatives' prosperity and labor force advancement too. The Human Resource (HR) bunches have more date readily available than any other time in recent memory. As of late, associations have the customary jobs as well as aptitude in regions like information science, information representation and learning. Progressions in data innovation (IT), prescient investigation, man-made consciousness and AI in HR measures is empowering experts to perform conventional practices without hardly lifting a finger and decreased stretch of time.

1. Recruitment and Talent Obtaining: One of the most basic choices confronting the working environment is enrollment and ability obtaining. The application of Artificial Intelligence (AI) for enrolling is engaging the associations to smooth out and modernize their enlisting endeavors by lessening or disposing of human intercession in tedious exercises like physically screening resumes. Ability securing programming has disposed of practically 75% of the business related to the enrollment cycle (Wislow, 2017). Utilizing a primer evaluation to screen out the potential competitor is basic undertaking and a long cycle particularly when the volume of information is high. The accomplishment of ability procure-

ment lies in building the relationship that changes over potential contenders to representatives. The force of Artificial Intelligence (AI) lies in its capacity to measure and oversee a high volume of information at quick speed, along these lines further developing effectiveness and efficiency of association. These equivalent highlights and advantages can be applied to the recruiting cycle. Man-made reasoning (AI) calculations can dissect the job portrayal, tokenize the watchwords and afterward investigate every up-and-comer's profile to coordinate with the necessary occupation title, expertise, experience, capability and so on

2. Training and Development: The requirement for preparing, direction and backing all through the underlying time with the organization for another representative is the foundation of achievement of any organization. Preparing is similarly significant for the current and just as new representatives. According to an examination conducted by Oracle, almost 27% of HR pioneers believe that AI-controlled answers for worker preparation will decidely affect worker Learning and Development. (Gautam, 2019) Man-made brainpower based preparing modules guarantee that the preparation programs are custom-made to provide food with the explicit need of the workers. Man-made brainpower (AI) mixed with representative preparing program stages gives more prominent mechanization, personalization and better vocation and expert turn of events. Man-made brainpower (AI) empowered preparation modules are intended to give the broadest conceivable range of methods, conventions, approaches and assets to resolve their issues and give constant answers for something similar. The new representatives may allude to the Artificial Intelligence (AI) driven mechanized data set framework to explain their questions hence alleviating the senior workers. With the steady computerized disturbance, Artificial Intelligence (AI) may likewise help the representative in reskilling and upskilling. This will serve a two way advantage. For associations, benefits incorporate suffering labor force. For representatives the advantages incorporate vocation and expert turn of events.

3. Decision Making: Human Resource Management (HRM) is tied in with deciding. Like the other utilitarian spaces of an association, Human Resource the board (HRM) need to manage settling on choices arranged at the development and benefit of the firm. A portion of the choices might be mind boggling in nature which requires profound comprehension of the issue, detailed data of the subject, basic reasoning and an organized methodology. With the blend of information base and Artificial Intelligence (AI), it is feasible to make modern data set models and incitement as reasons for dynamic.

4. Improve Employee Experience: As the world has been watching the unfurling of computerized change in each circle of life, representatives anticipate a customized insight at work. With the ability pipelines becoming unpredictable, know the beat of the representatives. Representatives expect pertinent, logical and helpful things that might be modified by their inclination and conditions. Man-made reasoning (AI) helps business pioneers to fix this issue by meeting four rules: explanation, consistency, association and culture. The wide ranges of covering of information with Artificial Intelligence (AI) empower innovation are compelling for further developing worker experience at the personal level.

5. Efficient Utilization of Human Resource Budgeting: The Human Resource (HR) planning choices are very intricate as it decides the drawn out monetary and monetary benefit of the business. As differentiation to the one – size-fits-all methodology that worked previously, the Human Resource (HR) chief presently depends on Artificial Knowledge (AI) driven calculations to make precise choices with respect to planning and asset allotment. (Prasanna Tambe, 2018) The crude benefit of Artificial Intelligence (AI) driven choices is that the data depends on realities and factual figures exposed to a basic arrangement of computations.

AI: CHALLENGES AND PATH

"Artificial intelligence" traditionally alludes to an expansive class of advancements that permit a PC to perform assignments that ordinarily require human discernment, including dynamic zeroing in on a sub-class of calculations inside AI that depend basically on the expanded accessibility of information for forecast errands. For sure, there have been significant advances in the spaces of example acknowledgment and regular language handling (NLP) throughout the most recent quite a long while. Profound getting the hang of utilizing neural organizations has gotten progressively normal in certain information rich settings and has carried us nearer to genuine AI, which addresses the capacity of machines to impersonate versatile human dynamic. Instead, regarding the administration of representatives, where the guarantee of more modern choices has been explained boisterously and frequently, hardly any associations have even entered the enormous information stage. Just 22% of firms say they have embraced examination in HR, and how modern the investigations are in those organizations isn't at all reasonable.

The viable utilization of AI to HR issues presents very various difficulties. They range from functional to reasonable, including the way that the idea of information science examinations when applied to individuals has genuine struggles with models social orders ordinarily see as significant for settling on noteworthy choices about people.

Think about the accompanying:

- A first issue is the intricacy of HR results, like what establishes being a "great worker." There are numerous measurements to develop, and estimating it with accuracy for most positions is very troublesome: execution evaluation scores, the most generally utilized measurements have been entirely censured for issues of legitimacy also, dependability just as for inclination, and numerous businesses are surrendering them out and out. (Cappelli P. a., 2017) Any sensibly perplexing position is related with different positions and subsequently singular execution is difficult to unravel from bunch execution. (Pfeffer) The informational collections in HR will in general be minuscule by the norms of information science. The quantity of workers that even an enormous organization might have is inconsequential three contrasted with the quantity of buys their clients make, for instance. Besides, numerous results of interest are once in a while noticed, for example, representatives terminated for lackluster showing. Information science methods perform inadequately when foreseeing moderately uncommon results.
- The results of human asset choices, (for example, who gets recruited and terminated) have such genuine ramifications for people and society that worries about reasonableness – both procedural and distributive equity - are principal. Elaborate lawful systems oblige how businesses should approach making those choices. Vital to those systems is the worry with causation, which is normally missing from calculation based investigations.
- Employment choices are additionally dependent upon a scope of complex socio-mental worries that exist among representatives, like individual worth and status, seen reasonableness, and legally binding and social assumptions, that effect authoritative results just as individual ones. Accordingly, having the option to disclose and furthermore to legitimize the practices one uses is considerably more significant than in different fields.
- Finally, workers are fit for gaming or antagonistically responding to algorithmic based choices. Their activities, thus, influence authoritative results. To outline these worries, think about the utilization of a calculation to anticipate who to enlist. As is normal in issues like these, the use of AI

procedures would make a calculation dependent on the characteristics of representatives and their work execution in the current labor force. Regardless of whether we could exhibit a causal connection between sex furthermore, work execution, we may well generally doubt a calculation that says recruit more white men since work execution itself might be a one-sided marker, the characteristics of the current labor force might be mutilated by how we employed before (e.g., we employed not many ladies), and both the overall set of laws and normal practices would make significant issues for us in the event that we followed up on it.

In 2018, Amazon found that its calculation for employing had precisely this issue for precisely this explanation, and the organization brought it down accordingly. Indeed at the point when the sex of candidates was not utilized as a basis, credits related with ladies competitors, for example, courses in "Ladies' Studies" made them be precluded.

If we rather construct a calculation on a more target measure, for example, who gets excused for lackluster showing, the quantity of such cases in an ordinary organization is too little to even consider developing a viable calculation. Additionally, once candidates find the substance of our recruiting calculation, they are probably going to react contrastingly in meetings and render the calculation useless. Most candidates definitely know, for instance, to respond to the inquiry "what is your most noticeably awful trademark" with a trait that isn't negative (Meyer, Amazon Reportedly Killed an AI Recruitment System Because It Couldn't Stop the Tool from Discriminating Against Women., 2018)

IMPACT OF ARTIFICIAL INTELLIGENCE ON HUMAN RESOURCE MANAGEMENT

Joining of HR rehearses with AI based applicants definitely have a more grounded sway in improving the authoritative execution. Despite the fact that AI applications may not have the capacities like people, the passionate and psychological capacities, however these incredible AI based HR applications can break down, foresee, analyze, and it is an incredible asset for any sort of association. (Prasanna Matsa, 2019) Yet, the genuine dread that is overwhelming the Global labor force is the way AI is showing its effect in work cutting across different areas all through the world. Yet, actually it isn't the trend setting innovations that are supplanting individuals, yet it is about how individuals should change and view these advances in making riches and flourishing. In, a genuine sense there will be some level of representatives who are influenced by the AI based capacities, so it is the obligation of the HR chiefs and associations to zero in on its worker needs and potential results. A large portion of the associations are effectively incorporating AI based devices in enrollment however in not so distant future AI is wherever in HR: May be in enlistment, preparing, on boarding, execution examination, maintenance and so on, But Majority of the associations are as yet slacking in coordinating AI to its HR-Practices in view of its expense related in reconciliation. AI execution ought to be seen as an idealistic chance, since AI improves lives, AI makes a better future in case it is plainly perceived and used in an appropriate manner.

CONCLUSION

Computer based intelligence is as yet a remote chance in any area of human movement, the speed of progress towards specific AI frameworks in medical care, car industry, web-based media, promoting and advertising is significant. Undeniably less advancement has been made in issues around the administration of representatives even on the initial step of the AI way, which are choices directed by calculations. It also describes how AI is useful in HRM, such as in recruitment and selection, talent, decision making. However, it has some challenges. Apart from this, there are still some HR managers who find it difficult to cope up with the advanced technology of AI. So, there should be proper training provided to all managers so they get benefit from it.

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Chapter 20
How New Age Technologies Are Used to Identify Consumer Behaviour and Its Change During and After a Pandemic

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ABSTRACT

In 2020, the whole world experienced a pandemic that rose in different parts of the world leading to a pandemic; many businesses were affected because of it, and it changed people's thinking towards life. It also changed how consumers looked at purchasing products online. This study focuses mainly on how the new age technologies like machine learning, internet of things, and artificial intelligence helps in identifying the consumer buying patterns. Consumer buying pattern on online shopping have changed over a period during this pandemic. This research highlights the role of these technologies in marketing and how it has helped the companies to create their marketing strategies. This research also includes the study of change in buying patterns of consumers during the pandemic and how it has increased over a period of time through primary research done with 30 respondents taken as a focus group.

INTRODUCTION

New Age Technologies, that includes AI (Artificial Intelligence), ML (Machine Learning), IOT (Internet of Things) when introduced to the world in the mid-20th century nobody thought these things would matter so much to the public or it would affect a lot of businesses or would touch so many lives at once. Fast forward to 2020, the world got hit by a pandemic which was due to the fact that there was a virus strain that got spread like wildfire in the whole wide world and lead to the state of a global pandemic. This generation has never experienced such a thing altogether as the last pandemic was the Spanish influenza pandemic which was from 1918-1920, which took over 100 million people's lives. When this pandemic

hit there were many reactions of people as it was different for everyone, since a global pandemic, there was a worldwide lockdown or an economy shutdown. This lockdown that was imposed changed a lot of things in people lives as well as in businesses and companies marketing strategies as social media marketing took a huge hit, online platforms like google meet, Microsoft teams and zoom were/ are used regularly for meetings/online classrooms & for taking decisions that once everyone thought could be done only physically.

Companies have greatly used New Age Technologies in their benefit in order to change their marketing strategies, in order to generate revenues and also to keep their companies alive.

Consumer Buying Patterns have also changed from going to the supermarket and buying household items/groceries became just a single click away. Consumers have changed their perceptions about online grocery buying, but now when the situation demanded, these applications have got a wide customer base.

RESEARCH OBJECTIVES

- To understand about new age technologies.
- To understand how New Age Technologies have helped brands in marketing their products
- To study the consumer buying pattern change during and after pandemic.

A questionnaire with a focus group of 40 respondents was studied as a sample survey and also secondary research is done by studying various research papers, Industry reports etc.

LITERATURE REVIEW

The researcher has explained how consumers had started or basically were made to shift to digital marketplace for their daily needs as there was no other option as such due to the pandemic. Reddy said that according to trifecta, since cheaper 4G network and constantly increasing consumer wealth, Indian EEcommerce is expected to grow to US$200 billion by 2026. But these projections were based on the precovid19. But because of COVID-19 hitting hard in India, the surging demand of e-commerce for the past few months is so high that the e-commerce industry could hit $200 billion much earlier. (Reddy, 2020), According to Suchi Bansal, consumers have rapidly changed their perspective towards buying online products, during covid-19 have seen a rapid increase in consciousness in hygiene and health effects of the same. She predicts after covid-19 supermarkets will se a drastic change in not having overcrowded stores for FMCG. (S, 2020), Sanstuti Nath has put a spotlight on the topic of whether lockdown has increased the digitization in india and whether it is going to last and will benefit the consumers. Top companies and brands were already benefiting themselves from these platforms, and also now post lockdown this whole scenario is going to change how consumers buy. (Nath, 2020). Millennials will buy in revenge once lockdown lifts; consumer behavior to change in these ways.It said that as the country is under lockdown for such a long time, the buying behaviour of the consumer, especially the Millennials are expected to undergo massive changes as most of them are going to do revenge buying, as they didn't get to buy goods as they used to buy in the pre- lockdown period. And if the e-commerce industry is talked about, they are estimated to be the clear winners, especially in the FMCG online sales, in the short and long term both, as part of the strategies of FMCG companies (Nath, 2020).

The surveys done have estimated that the pandemic breakdown and lockdown are going to bring major changes in how the Indian consumers going to buy goods or their buying behavior. If essential commodities are talked about, there will be a major shift from 46% to about 64% in online shopping in the next 6-9 months. Also, as compared to 59% of consumers, around 46% of consumers are going to buy from physical stores. A survey conducted showed that nearly 74% of consumers prefer to buy online post the lockdown (PTI, 2020). The retail outlet LOTS wholesale have stated that as consumers are now more conscious of their health and protection against the pandemic, there is going to be a drastic change in the consumer behavior especially in buying FMCG goods and all retailers will be bound to do the sales on online platforms, that is the e-commerce portals to meet the demands of consumers and promote contact-free ordering and Delivering services. Also, they said that to cater to the changing needs of customers there would be a need to have an omni-channel strategy, online to offline. As for now, there is increased demand for only essential commodities but a considerable amount of time will be taken for shopping behavior to get normal, as purchasing habits are going to change drastically. (PTI, Post lockdown, online-to-offline strategy to get prominence in the retail sector, 2020)

India e-commerce market picks pace, may touch 7 trillion rupees by 2023 Due to the coronavirus pandemic it has pushed the consumer to shift from offline retail stores to online shopping, according to CAGR it says that in 2023 Indian e-commerce would be 7 trillion rupees by 2023. CAGR mentioned that the annual growth of e-commerce is 19.6% between 2019 and 2023. The major growth can be seen in the 2 leaders of e-commerce Flipkart and Amazon. And because of online shopping, the shipments of smartphones in India rose by 8% YOY to 152.5 million units, which makes India the fastest growing market among the top 20 in the world. (Laskar, 2020) **Writankar** Top multinational from HUL to Apple brace for rising online sales post Covid-19 India's largest FMCG goods company HUL chairman Sanjiv Mehta said customer has this fear of coronavirus due which they are scared of going out to buy even essential goods for them. Online FMCG sales rose to 50% YOY during the March quarter as consumers are more interested in shopping e-grocers instead of local kiranas. In Nielsen report, they mentioned that local retailer share fell by 220 bps, entirely taken by either ecommerce or modern retailers in this pandemic lockdown. (Writankar Mukherjee, 2020), Due to the coronavirus (COVID-19) more consumer shifted their consuming habits to online. According to the latest report by IPSOS, the jump in e-commerce shopping where India (55%), China (50%), Italy (31%), and Vietnam (56%). This new habit of consumers going to be long last for decades for the e-commerce industry. (Writankar Mukherjee, 2020). FMCG companies see a surge in online business Both big and small companies in India have built the expansive distribution networks through kirana shops and supermarkets during COVID 19 lockdown, with this reason large scale of customers moved towards the online retailers and buying essential goods on the internet. As Sunay Bhasin (marketing head at the company that makes a variety of packaged food products) he said that e-commerce business double, lots of tie-up has been done, and created its own website to reach more cities and pin codes. Beverages companies like parle agro sell the frooti and appy fizz brands have seen the jump of 300% increase in sales through e-commerce from the past 1 month. Overall, the ecommerce is expecting 15% in this lockdown period. Elite foods (Kerala – based packaged foods company) saw a 100% increase in the sales in some of the food products they deliver like, cakes, bread and buns, instant mixes, specialty flour, and healthy range. (Tandon, 2020)

The impact Covid-19 pandemic is exerting on ecommerce The e-commerce industry gained its momentum much before the pandemic, however, with the implementation of pandemic lockdown a pressure has been imposed on e-commerce companies, not for the non-essentials but the essential commodities like groceries and medicines which can be seen both as a challenge as well as a greater opportunity. As

earlier, shopping online was a matter of convenience but now it has become a necessity to protect oneself from the virus by avoiding crowded places. The Covid-19 lockdown has resulted in a rise in online sales, as it has also been estimated that the industry would have a growth of 200 billion dollars much before the predicted 2026. (Basu. P, 2020). Online sellers recover 30% order volume in a week. Everyone, especially businesses are curious to know how consumer behavior is going to change post lockdown period. As to meet the demands, consumers have shifted to the online Industry, have witnessed a rise of 100 percent as compared to the pre lockdown period in FMCG products. However, these companies are allowed to do their operations as per the red, orange, and green zones in the country. While, the online fashion industry is expected to rise again after the lockdown, whereas, the cosmetic sector has not seen any recovery till now and will take a little longer to recover. (Khetarpal, 2020)

Large retailers to focus purely on ecommerce during lockdown 2.0 due to exemption. As an exemption to the e-commerce industry, retail chains are now focusing on bringing their products on online platforms to boost their sales. Big retail companies, like fashion retailers which is a non-essential commodity during the lockdown, have stated that they are now going to make an online presence of their products. Seeing the growth opportunity of e-commerce, big retail companies from essential to non-essential are planning to collaborate with top e-commerce companies like Amazon and Flipkart for a stronger supply chain and logistics. (R. Bailey, 2020). As with the ongoing lockdown period, FMCG products are on high demand, but once the lockdown gets over, how consumer behavior is going to change is a big question. With the lockdown 3.0, e-commerce platforms have been permitted to sell non-Essential items in the orange and green zones and with this Flipkart has stated that the most searched belongs to the personal care products like trimmers, electronic goods like mobiles, laptops, and fans air conditioners to beat the heat. Snapdeal claimed that they have received a huge proportion of 75% of the total orders from these orange and green zones in the country. Estimates are that, there would be huge demands for items like these post lockdown period. (Avatar, 2020). Till lockdown 3.0, the e-commerce companies were allowed to deliver the essential commodities as well as non-essentials to only orange and green zones but with lockdown 4.0 E-commerce companies have welcomed the guidelines of the government to deliver essentials and non-essentials in all the three zones, however, containment zones will be getting only medicinal deliveries along with the groceries and so. With all this e-commerce companies are trying to meet the ongoing demand for all the categories of goods and are estimating this to be an opportunity for e-commerce platforms. Till lockdown 3.0, the e-commerce companies were allowed to deliver the essential commodities as well as non-essentials to only orange and green zones but with lockdown 4.0 E-commerce companies have welcomed the guidelines of the government to deliver essentials and non-essentials in all the three zones, however, containment zones will be getting only medicinal deliveries along with the groceries and so. With all this e-commerce companies are trying to meet the ongoing demand for all the categories of goods and are estimating this to be an opportunity for e-commerce platforms. (Avatar, 2020)

NEW AGE TECHNOLOGIES

A machine that can solve problems human-like and not within the boundary is known as artificial intelligence and it is rightly said by the father of AI John McCarthy.

AI is an automated computer program that is made by the humans to help the human work in increasing efficiency but also making people's lives easier. Many times, we don't realize that AI is a part of our

daily lives likes in shopping websites the suggested items that is shown to its customers it is done on the basis of the cookies that is AI. It is also used like for chat-bots for companies that provide consumers with goods as well as FMC goods. As now days the companies have a lot of customer base that needs to be managed so that is done by an automated system known as chat bots that are configured according to a set number of questions a consumer asks.

AI plays a very important in role in streamlining service business operations by doing most of the work that is time taking as well as very tedious, AI performs various tasks like data analysis, data mining, that helps the industry as a whole or a company where it is being done.

AI also plays a major role in doing some predictive analysis that helps the companies or rather the top-level management in understanding/deciding what their next move or target should be and how would their company be able to satisfy the customer.

New age technologies involve the following technologies:

- Artificial Intelligence (AI) and Machine Learning
- Robotic Process Automation (RPA)
- Edge Computing
- Quantum Computing
- Virtual Reality and Augmented Reality (VR & AR)
- Blockchain
- Internet of Things (IoT)
- 5G.

HOW HAS THE NEW AGE TECHNOLOGIES HELP IN MARKETING?

New Age Technologies include AI, ML, & IOT. These technologies have been used a lot over the past decade for a million of things but using it for marketing has increased over the past five years and it has increased a lot during this pandemic.

Ai in Marketing

AI marketing utilizes artificial intelligence that is also known as manmade computer brain to settle on computerized choices dependent on information assortment, information examination, and extra perceptions of crowd or monetary patterns that may affect marketing endeavors. AI is regularly utilized in marketing endeavors where speed is fundamental. AI devices use information and client profiles to figure out how to best speak with clients, at that point serve them tailored messages at the perfect time without mediation from marketing colleagues, guaranteeing greatest effectiveness. For a significant number of the present advertisers, AI is utilized to increase marketing groups or to perform more strategic assignments that require less human subtlety. AI marketing use cases include:

- Data Examination
- Natural Language Handling
- Media Purchasing
- Automated Dynamic

- Content Age
- Real-Time Personalization

Ml in Marketing

ML instruments can be a gainful piece of assisting advanced advertisers with revealing and comprehend this information better. By following shopper drifts and delivering significant bits of knowledge, ML apparatuses permit you to invest energy streamlining your errands to arrive at more leads with your substance.

Pay per click campaigns: Gone are the times of advertisers attempting to examine informational collections to quantify the adequacy of pay per click (PPC) campaigns. ML devices can help level-up the PPC campaigns by giving the data that illustrates:

- The measurements you need to help drive your business forward
- How you can improve, key choices dependent on the top execution drivers
- Overcome the battles that hold you back from meeting PPC objectives

Search Engine Optimisation (SEO): SEO is as yet a significant part in a balanced computerized methodology, with numerous advanced advertisers deciding to have practical experience in this exceptionally sought-after ability. Be that as it may, as SEO calculations change across significant hunt stages, the experiences from accessible substance may turn out to be more important than explicit watchwords in the inquiry interaction, because of AI and ML devices. To guarantee that the site pages and online assets maintain their high-positioning put on internet searcher result pages, begin considering the nature of your substance instead of basically the catchphrases included. Thusly, you'll be on the ball with regards to future-forward content creation and SEO.

Content Management: To drive brand mindfulness and construct commitment, advanced advertisers should make significant associations with leads, possibilities, and clients the same. As you endeavor to improve your exchange and create commitment across various online stages, ML devices will be tremendously useful in investigating what kind of substance, catchphrases, and expressions are generally applicable to your ideal crowd.

Iot in Marketing

The Internet of Things (IOT) enables marketers to create very different experiences in bridging the digital and physical world and certainly when they dare to think out of the box and beyond the pure aspect of personalized messaging. Nowadays, most Internet of Things projects are about the optimization and automation of processes and goals that are only indirectly related with the customer and with customer experience as we mentioned when covering 2016 research from IDC. However, in some industries, like retail, there are stronger external and customer-facing components, whereby the focus on customer experience and customer engagement is more important.

DATA ANALYSIS AND INTERPRETATION

Figure 1.

educational qualification
37 responses
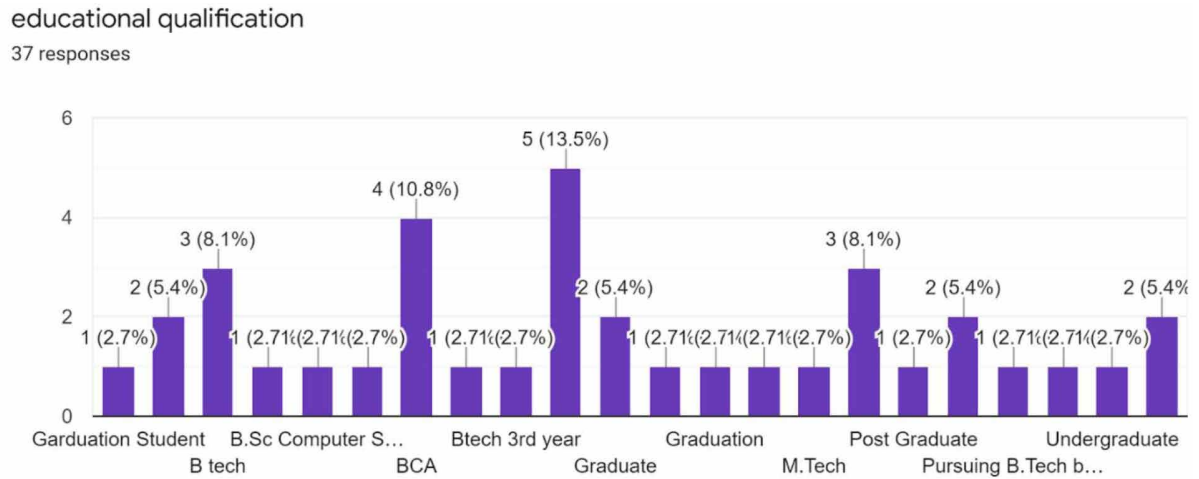
This question evaluates the focus group that is the number of respondents who are basically undergraduates who have completed or about to complete their degrees.

Figure 2.
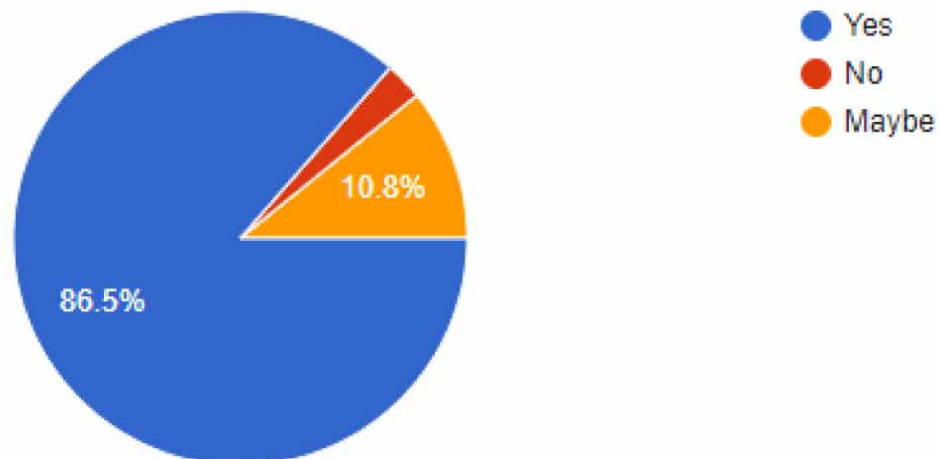
This question relates to the buying of products online, to check whether the respondents buy products online or not.86.5% of the respondents say yes that they do buy online products, 10.8% are not really sure.

Figure 3.
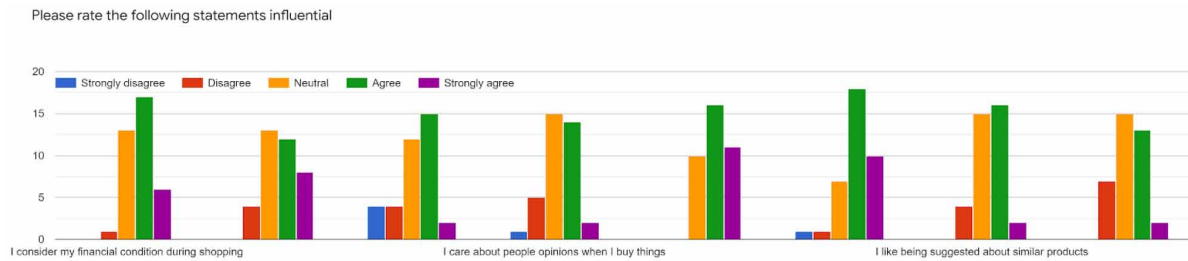
This question relates to the information on the following questions:

- Do I consider my financial position while ordering online.
- Do you use social media to follow latest fashion trends?
- Do you care about people's opinions when I buy things?
- Whether you like personalized advertiesments?
- Do you buy products that suit your personality?

Figure 4.

This question highlights if that consumer has increased online shopping due to this pandemic.

48.6% of the respondents say that yes, their shopping online has increased significantly, where 24.3% say no and the rest are not sure.

This question was to get to know whether the consumers know about the cross-website tracking used by web tracking apps by online shopping. Tracking means cross website tracking done using cookies to know what are the consumers buying preferences and what are they looking for.

This question relates to the topic whether the products shown in the suggested section of online shopping websites and whether people see it or not.

286

Figure 5.

Do you know while online shopping your activities are being tracked
37 responses
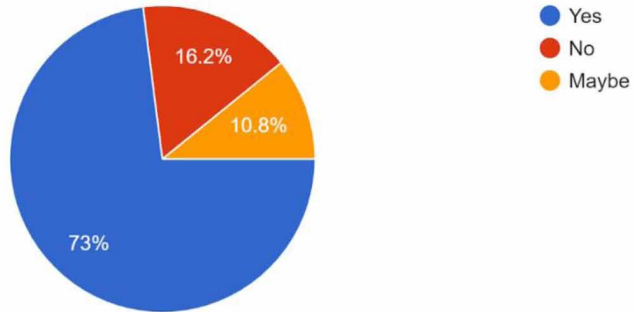
Figure 6.

Do you see similar products in ads on other sites when you searched it on shopping websites?
37 responses
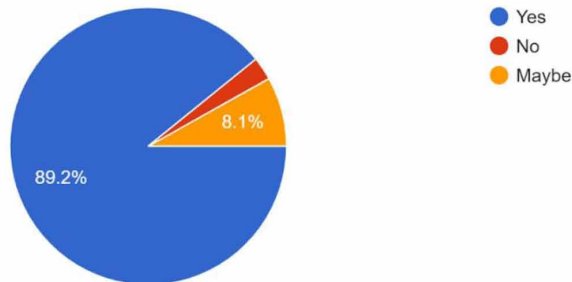
Figure 7.

Do you prefer the showing of suggested products ?
37 responses
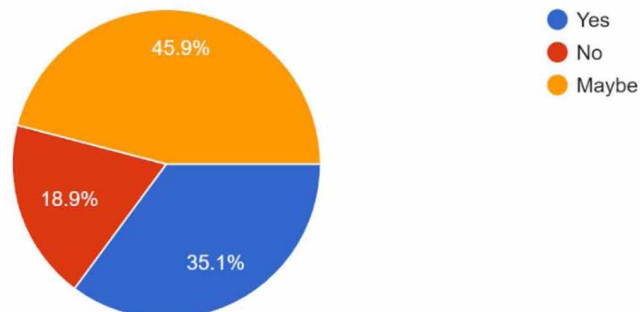
287

This question relates to the topic of whether the consumers like the showing of suggested products or not. suggested products are shown by the use of cookies, it helps to identify the needs and wants of the consumers and similar products are shown to the consumers using discounts specially catered to the consumer.

FINDINGS AND INTERPRETATIONS

Online shopping provides greater convenience in aspects of time and location compared to shopping in-stores. However, one reason why some consumers still prefer to shop in physical stores can be that it is more difficult to process information when they shop online When consumers shop online, product information is often limited to images and product descriptions provided by sellers. Managers might want to utilize recent technologies to help consumers make decisions more easily while they shop online. On Carvana, consumers can view the car and interior virtually with patented 360 photo technology. Amazon offers virtual clothes fitting experience by utilizing augmented reality (AR) technology. Virtual reality (VR) and AR techs are expected to open new opportunities for personalized shopping experiences online.

As the researcher have asked in the question for the respondents whether they buy products online 86.5% say yes that they do, 2.7% say no that they don't do online shopping at all, 10.8% say that they maybe do maybe do not.

The next question comes in that if the respondent's online shopping has increased in this pandemic in comparison to normal days, 48.6% said yes, 24.3% said no, and the remaining 27% said maybe. The next question asked by the respondents in the questionnaire was whether they knew their activities are tracked by cookies, 73% said yes, 16.2% said no and the remaining said maybe. The next preferential question asked by each respondent was whether they liked the showing of suggested products, 35.1% said yes, they did, 45.9% were not really sure and 18.9% said no. As according to the primary research done it becomes clear to an extent that consumers have had a forced shift in their paradigm in terms of buying products through online platforms.

It is yet not known to the consumers that they are being tracked from website to website using cross website trackers and whether they are okay with the same or not.

RESEARCH GAP

This study involved the study of buying patterns and the change in consumers buying behavior and how the e commerce websites have used AI to identify the change in consumer behavior.

CONCLUSION

The research that has been conducted has shown results which indicate that consumers who have never bought anything online are also now changing their buying patterns due to the lockdown as well as due to the convenience. The data clearly shows that new age technologies have helped the companies to identify the changes in the consumer buying behavior during and post lockdown in India. Due to the lockdown a forced paradigm shift in the online goods purchasing was observed but it has led to an

288

increase in businesses of the online e commerce websites and also made to realize the convenience of buying products online.COVID-19 helps E-commerce to generate more customers because everything was lockdown and people were scared to step out from their house, so they preferred to buy goods online and many of the new customers also joined.

New Age Technologies have also helped to understand how consumers having changed buying patterns and what would they like to buy by cross website tracking and by the use of cookies that help them to identify their potential customers.

FUTURE SCOPE OF THE WORK

As India has one of the cheapest 4G internet in the world and everyone is easily connected with each other. Everything which we see this world is just a couple of seconds away. This research paper will help students to show how due to COVID-19 virus, many e-commerce industries took this opportunity to boost the sale essential goods online and this research paper could also help companies to see the wide opportunity in the future and how customers are so much interested in buying essential goods online. The income level of the consumers does not matr, what is their occupation, what is their gender, everyone is interested to buy essential goods online. Many e-commerce companies should be aware of the huge demand that is going to come in the future because during this lockdown period many of the E-commerce companies would not able to fulfill the demand of the consumer. Ecommerce is going to be the biggest market for India in the upcoming years as everything in India is going digital so rapidly and everyone has internet data packs.

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Chapter 21
Role of Artificial Intelligence and Its Impact on the Tourism Industry of India

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ABSTRACT

The first thing in our minds when we talk about tourism and travel is how convenient the technologies have all made it for us. Artificial intelligence in the travel business is already developing enormous importance. The advanced applications of AI and robotics will certainly provide a rich experience to the customers of the traveling industry. Some of the well-known applications including language translators, chat-bots, virtual reality, and many more are certainly showing a huge impact and their effectiveness when applied in the travel and tourism industry. The study mainly aims to define the tourism sector in India and its impact on the tourist industry by emerging technologies, such as artificial intelligence. It will also define how tours and travel are safer and more secure in the future.

1. INTRODUCTION

We all are bare eye witness to this technological world, how the world has been driven towards the advancement of technology. The innovation to new technologies always created a world revolution in various industries across the globe. Artificial Intelligence (AI) is one of the most brilliant innovations

of our technology-driven age, revolutionising different industries throughout the world. Artificial Intelligence (AI) is the development of computer systems that can perform tasks and activities that need human intelligence. (Russell and Norvig, 2016, p. 4). The most effective and advanced technology till date remain the Artificial Intelligence (AI), it the power to change the whole world entirely and begin a new era of technologies. AI is referred to that advanced computer system which works with human intelligence in order to perform the tasks or activities. (Patel, 2021).

In the year 1956, the first appearance of Artificial Intelligence was coined by John McCarthy in his Dartmouth Research Project, since then over years and years AI was improvised and has changed the traditional work of this world. With passing time, gradual progress has been done in the field of technology and thus its significance has been increased, by the 1980s. The world was witnessing the progress on the field of AI by the 1990s which was worth in such development. (Viglia, Furlan and Ladrón-de-Guevara, 2014) Because of the growth of advance technologies the engineers were able to get access to the large data and was successful in building the robots, which was very effective research. Thus, the concept of AI has grown to a potential since back then and now in this 21st century Artificial Intelligence has already reached to its peak, as a result it is now involved in every industry such as health-care, education, marketing, public relation, small business and even in tourism sector. (How Artificial Intelligence (AI) is Changing the Travel Industry, 2021)

21st century has become the era of digitization, and it has been seen that the growth in the tourism industry is incredibly increasing day by day, according to the insights over 10.93 million foreign tourist arrived in India in last to last year (i.e. 2019) and the growth in constantly increasing at much higher rate. (How Mobile Influences Travel Decision Making in Can't-Wait-to-Explore Moments, 2021) Technology is one of the important reason that the industry is having boosted performance and the quality service, AI has completely changed the tourism world and the traditional hospitality, in the dynamic market it has gained a competitive advantage. It seems that the tourism industry has welcomed AI by wide open arms, and adopted its every part efficiently, which turned out to be huge advantage for the industry. AI technology is leaving its unique mark within the tourists by enriching their experience of traveling. (AI Assistant: The Future of Travel & Tourism with Emergence of Artificial Intelligence - Imaginovation, 2021)

As a modern issue, artificial intelligence (AI) in the Travel, Tourism, and Hospitality Industry is a contentious issue. Tata Consultancy Services, Google Travel, Trip Advisor, etc. have undertaken a number studies in the recent past on the usage of AI in the Travel, Tourism & Hospitality Industry. The whole concept of this paper is to highlight the Artificial Intelligence Technologies that has entered in the industry of tourism and since then a continuous gradual revolution has taken place in this industry for the good. This paper attempts to enlighten the viewpoint about various AIs which certainly dealt in the tourism industry and left their mark in the industry. In such times, we see the power of technologies that has brought the world together and it has a high level of influence on the industrial environment.

2. REVIEW OF LITERATURE

Artificial Intelligence had invaded in the tourism industry a while ago, and with passing time it is showing a great growth in the tourism and as well as hospitality sector. (Kim and Hardin, 2010) Mentioning of few of the companies like, Tata Consultancy Services, Google Travel, Trip Advisor, and many more have adopted AI in their system, and as an out-turn this has become one of the success. (Jang and Yeoun, 2020) According to a study of Tata Consultancy Services, 85 per cent of the travel and hospitality ser-

vice providers uses AI for good decision making for all the purpose. Also nearly about 74 per cent of the people plans their tours in internet only, among which 45 per cent are those who uses their smart phones for planning their trip, a study by Google Travel and Trip Advisor. (Predictions 2017: Artificial Intelligence Will Drive the Insights Revolution, 2021) Other studies suggests, nearly 85 per cent of the people plans their tours after they reach their selected destination. There are 36 per cent of customers who prefers an interactive booking session by knowing all the details about the trip, and 80 per cent of the customers likely to have a self-service technology over the traditional process. (Four Ways AI is Re-imagining the Future of Travel | Mindtree, 2021) Also, 90 per cent of the customers want to get the correct and relevant information about the trip after reaching their destination. (Impact of AI and robotics in the tourism sector: a critical insight | Emerald Insight, 2021)

Considering all the insights together, it clears the picture that customers have a positive intention towards the internet and advanced technologies like self-services. The above mentioned findings encourages the marketers of the tourism industry to involve more and more advance technologies that will potentially help to grow the industry. (5 ways AI powers business travel, 2021) And a developing country like India has a huge scope in this industry as the number of tourists are increasing, also India is well known for its historical significance which eventually engage more customers towards it. (Barnes, 2016) Thus, having this smart technology in India will highly benefit the industry and also will help to grow the economy. The findings also throw the light on those majority of customer who prefer technologies over the tradition. (7 Successful Applications of AI & Machine Learning in the Travel Industry | Hacker Noon, 2021)

Keeping aside all these factors there are many more that eventually influences the travel and tourism industry. (Touni and Magdy, 2020) Below stated those factors that influence this industry, the most important thing is the selection of the tourism, travel, and hospitality services, likely,

- Natural Resources
- General Infrastructure facilities
- Tourist Infrastructure
- Destination Tourism Infrastructure

The required information for all the significant factors such as, Natural Resources, General Infrastructure facilities, Tourist Infrastructure, Destination Tourism Infrastructure, etc. could provide by the Artificial Intelligence, as this technology works by the stimulation of the human intelligence, therefore can provide a wide range of required data on all the factors within no time. (Machine Learning and Data Analytics in the Travel Industry, 2021) AI can easily meet-up the requirements of the customers by giving them the most current information about any factors that they would like to know, such as Natural Resources, General Infrastructure facilities, Tourist Infrastructure, Destination Tourism Infrastructure, etc. This information can be transferred to the customers via interactive messages, self-service tech., chat-bots, virtual tours through VR, etc. all this these technologies and more are being briefly discussed below. (Millennial's engagement with fashion brands: A moderated-mediation model of brand engagement with self-concept, involvement and knowledge | Emerald Insight, 2021)

The main research gap identified by studying the above papers, that it is much important to discuss the impacts of the AI technology applications in the tourism sector, weather it is going to be a success or will be a great failure in future. Every author has well explained the upcoming trends of technologies and the advanced applications but the limitations were they lacked in describing the current scenario of India in terms of technologies, that how challenging it is for the technologies to come into action in India,

293

as due to numerous factors that India is lacking behind in technological aspects, as well as the papers lacked in the prediction of future and what impacts can Artificial Intelligence technologies applications can bring in the sector of tourism of India. Thus, this paper will be focusing in this part.

3. OBJECTIVE OF THE STUDY

The aim of this study is to bring up the AI technology applications into the knowledge of the public, so that this application showcases their high profitability in the sector of tourism in India. Also, it will identify the possible challenges and future scopes for AI technologies in this field of India.

4. METHODOLOGY OF THE STUDY

A detailed study on the emerging technologies of Artificial Intelligence and Robotics implemented in the tourism sector is presented in the form of a viewpoint. The whole study was based on the quality research on secondary data. The data was used to understand the current trend of the tourism industry, and how AI applications could be more productive in developing country like, India. Further, the predictions are made for AI technologies in the sector of tourism, on the basis of current data and information the future scopes are identified for India. The information was collected from various sources (like, research papers, research articles, government websites, and form the news articles).

5. ARTIFICIAL INTELLIGENCE APPLICATIONS IN THE FIELD OF TOURISM

With passing time, the world is continuously upgrading itself day by day, the advancement of technologies are so rapid now a days that we couldn't have imagined earlier. In the domain of Artificial Intelligence several new technologies are evolved, with this advanced technology the tourism industry is able to give their customer a rich experience of their trips. These technologies are Facial Recognition, Virtual Reality applications, Chat-bots, Robots, Google Maps, Language Translator, Audio Tours, and so forth. Below will be a brief discussion of few very important applications which are much involved in the tourism industry:

5.1. Facial Recognition Technology

Facial Recognition system is a technology that is well capable to match a human face from a computerized or digital picture or from a video in a motion. It basically matches the facial pattern of a person and finds the similar pattern in the digital picture of the database. Although the facial recognition technology has a slight low accuracy compared to the biometric scanner or the iris recognition, it is much more popular and adopted in a wide range because of its contactless process.

294

5.2. Virtual Reality (VR)

The Virtual Reality (VR) is a type of technology in which the user will get a real experience but not in reality rather virtually. This technology is mostly used in the purpose of entertainment i.e. video games and for educational purpose i.e. medical studies. This technology basically creates a 3D, digital world. This has been introduced in the tourism industry recently, for eliminating the gaps between the customer and service provider.

5.3. Chat-bots

Chat-bots are the software that performs a conversation via textual or auditory mode. Mainly there are only two of Chat-bots, namely, Text message-based chat-bots and Voice based chat-bots. By the name it is clear out of the picture that text message based chat-bots uses pre-loaded answers of the frequent asked questions by the customer, whereas voice based chat-bots uses voice messages to fulfil the quarries of the customer. In the tourism industry this application turned out to be the most significant because there is no language gap between the bots and the customers, therefore, enduring the quality experience of the customer.

5.4. Robots

Robots are AI technology driven assistants that are networked via Internet of Things (IoT) which performs particular activities assigned to them, such as systems to ensure that the luggage of the guests are checked in automatically, system that receives the guests, and simple works like turning on/off the air-conditioner or television. Introduction of robots in the tourism industry is one worthy factor as the labour cost has reduced by one-time investment and also the customers get enhanced experience.

5.5. Google Maps

GPS (Global Positioning System) technology is used in Google Maps for assisting the traveller about the direction of the path. The AI in Google Maps keeps the traveller updated by informing about any accident or traffic jams ahead. It also helps the traveller by choosing the shortest route possible. Google Maps came up with a solution to the common problems of wrong direction that is VPS (Visual Positioning System) where the traveller will get a real world view and visual landmarks. This steps made the journey much safer.

5.6. Language Translator

Language Translator is one the best thing happened to the industry. Applications like Google Translate can translate many languages, thus can help the tourist to interact with the locals. This application also provides a feature of 'conversation mode' in which both the parties can talk one after another and the translator will detect the language and translate into the understandable language, suppose, if the traveller knows only English and the locals can speak only Bengali, therefore the traveller will speak in English in the translator and automatically after selection of the language it will translate the voice into

295

the Bengali language and vice versa. Also the traveler can scan any picture message of any language that will automatically be translated to the default language of the system.

5.7. Optimization Services

Optimization services use the Artificial Intelligence in combination with the Maximum Likelihood algorithm, which uses the past data and suggests the likelihood values of the prices. It basically suggests the customer the best time when the price is going to drop or when it is going to be high in the area of tourism, such as accommodation and hotel, flight fare, taxi services, and so forth. This helps in the decision-making process of the customer.

6. ARTIFICIAL INTELLIGENCE TECHNOLOGY OVER THE TRADITIONAL PROCESS

The invasion Artificial Intelligence in the tourism industry has made a huge difference in delivering the services, those are discussed below:

6.1. Facial Recognition Became the Automated Document Verifying System

The facial recognition technologies certainly provide a hassle-free check-in at everywhere, such as at airports, railways, and in any other stations, also without any immigration document verification the travellers could be allowed, also it helps in the custom department, and in many other places. This technology recognizes the facial pattern of a person and matches within the system, within very less time. It also ensures the traveller about their safety and security of the data by the use of block-chain technologies. In country like India this technology is much useful as the population is high and for the verification of the documents it requires time, thus, this can help reducing the time taken and can make it flawless.

6.2. Virtual Reality (VR) Technology Directing the Tourism Industry

It has been seen that most of the customers are not satisfied with the services of the service providers, they could not meet their promises and as a result the expectation of the customer is hurt. The customers who are way from the destination spot they have no idea about their staying place, majority of them would like to experience the exploration of the tourist spot before their reach. In general they would like to consider many factors before they travel, like the beauty view, the lakes, the mountain range view, and the explicit uniqueness of the nature, etc. Thus, Virtual Reality comes into the scenario, VR is a technology that helps the customer to experience the reality but in a virtual format, unlike reading the old reviews of other customer they get the best of best experience in virtual mode before experiencing it in reality. It creates a 3D model and let the person enter the digital world for the best experience. Thus, virtual reality technologies are much helpful for the customers to access the tourist infrastructure facility, destination tourism infrastructure, natural resources and the general infrastructure, which eventually helps to influence the customer to visit in reality by making their positive decision-making process. Recently in India this VR technology is being used 76% over five years, and certainly has the potential to grow more in coming years.

296

6.3. Chat-Bots Guides the Tourists About Their Numerous Questions

Chat-bots are the pre-programmed software that simply answers to the quarries raised the customers. After any customer reach their destination they tend to have numerous questions regarding the destination tourism infrastructure to tourism infrastructure. Also they tend to curious about the food facilities at the hotel likely, timing for breakfast, lunch and dinner, also about the laundry as well as if gym services are available or not. For some of the security purpose regarding their safety they have many questions. The customers also like to know about the nearby places to visit like, malls, parks, clubs, bars, and casinos, etc. Thus, chat-bots help in such situations, there are pre-loaded answers to the questions of the customers that are very frequently asked, therefore with in no time the answers are given to the customers, which enrich their experience during the stay. In India the chat-bots are used numerously and mostly in the tourism sector nearly 40% is in use. Thus, this application is much compatible with everyone and as well as the system.

6.4. Robots Taking Over the Hospitality Services

As the hospitality services are done the smart robots, therefore, the term has been coined "Smart hospitality", which is growing gradually and is expected to grow over 25 per cent by the end of the year 2021. The smart robots please the customer in various surprising ways, providing services that might the customer never thought off, it keeps the customer engaged, therefore, creating a pleasant experience in their minds. Not only this, but the robots can also direct the guests to the rooms as well as carry their luggage, also can provide room keeping services, serving the food and drinks. This, engagements of the robots enhance the experience of the customers, and they like the human-tech communication. This technologies, if brought to the industry of tourism in India, will definitely improve the tourism sector. The robots used in India, in all the industries are around 39% and in tourism industry is very less nearly about 10%. But robots have the potential to make a huge difference.

6.5. Google Maps Became the Local Guide

Now a days, Google Maps has become a part of our daily life, whenever we are traveling we use Google Maps for best directions. Google Maps uses GPS and VPS, which is an Artificial Intelligence technology, that provide the general information about the traffic in the road, and suggests the best path to choose. Those who come for tourism in India, Google Maps always helps them as a local guide, it gives the direction of a place where they would like to visit and also it suggests the best things nearby likely, best restaurant for dinner or lunch, accommodation facilities, and many more things for more diverse experience. It is one of the most used application around the world, therefore, the use of Google Maps are very high.

6.6. Language Translators Removed the Language Barrier

In the past we have seen how language became a barrier for the tourists, they couldn't connect themselves with the locals due to the variation in language. But now time has changed and technologies made it possible to remove the language barrier, therefore, everyone can connect with everyone. This language translator has replaced the job of the local guide, by translating the unknown language to the understand-

able language to the tourists, thus, message can be easily conveyed to one another without any hassle. Thus, this language translator helps the tourists in the pathway of the entire journey. In country like India, we have a diverse culture and many languages so translation applications are very much effective in India, nearly every tourist, about 90% use the translator for reducing the barrier of language.

6.7. Optimization Services

Optimization services that incorporate strategically pitching the items, improving the costs utilization by the Maximum Likelihood algorithm that addresses the general infrastructure facilities like road, public and private transports, by providing the ideal costs of the flights, taxi services, and so forth. These optimization services provide various data on the ideal cost of the tourist infrastructure. It also includes, accommodation facilities, restaurants, clubs, bars, malls, adventure activities, etc. Generally, it provides the best available option to the customer, thus, the optimization services gives few facilities that are incorporated under the tourist infrastructure.

Thus, with the help of AI technologies it is possible to bring a huge change in the process of tourism in India. The followed traditional process will be enhanced by the upcoming technologies. The growth will be over 10% by the next two year, in terms of technological growth in India. This will certainly enhance the economic growth in the tourism sector. Considering the gradual growth over years in this sector, 2.4% last to last year (2018), 3.4% last year (2019), it can be said that by the year 2022, there will be a growth of 6% to 7% in this industry.

7. CHALLENGES FOR AI IN THE TOURISM INDUSTRY

With the rise of new technology, every sector will keep facing the consequences and the travel industry is no exception. However, combining AI with intelligent personalization can give good results but we can't deny its challenges. Some of the major challenges are caused by those who don't know about the system, this is a major problem in India as majority of the people are not quite aware about the advance systems. These challenges will have to be surpassed when the demand of the innovation and technology will be high and will be required innovative solutions and the policies have to be updated.

The biggest question is "Will Artificial Intelligence replace the human intelligence?", but the answer is quite simple without the stimulation of human intelligence also it can be benefited in various areas of business. One factor that it would be replacing some of the jobs of employees and will provide a monetary benefit and will also provide non-monetary benefits by providing excellent and unique service to the customers. Thus, will anyhow enter the new markets and will bring revolution in it.

One of another major challenges of the use of AI is the security of the data. This is the major concern of the application of AI in use, for the sectors like finance and military it is one of the biggest challenge. Any data leak in this sector can lead to a nationwide threat. For instance, facial recognition system uses the block-chain technology for the security of the data, but still in some of the countries likely India is reluctant to use this technology due to the security of the data. Sometimes, Chat-bots can also become a threat because it stores the travel history of the customer which is a data privacy concern.

Another challenge is the attack of the small malware, as this system is software controlled thus a small attack of malware can disrupt the system and its operation which will eventually lead to a chaos. Thus, continuous update of the system is required. Also, needs a huge money to invest.

Infrastructure is another one of the important challenge among all, in India we do not have the proper infrastructure facilities for implementing artificial technologies to its best. Also, the investment of capital is a major factor, many are not ready to invest in upcoming technologies rather they like to follow the traditional ways in tourism.

Initiative by the government of India regarding the adaption of new technologies are quite less effort, in comparison to the other developing countries. The focus on the technological part is less which certainly needed to be enhanced or else we will be lacking much behind the world in terms of technological aspects.

Therefore, the above mentioned challenges are in context to the country, India. This challenges are to be faced while adopting the technologies but looking towards the benefits this challenges can be affordable for the improvement of the business sector in terms of economy and surely will enhance the travel and tourism industry.

8. FUTURE OF TRAVEL AND TOURISM IN INDIA WITH AI TECHNOLOGY

In addition to changing our lives, travel has also transformed the way we travel. There are changing expectations for today's traveller. They demand comfort, convenience, and pricing without compromising. AI might totally change the travel business if it is fully harnessed. Assist in passenger identification while travelling and tailor a traveller's experience through curated recommendations, artificial intelligence could revolutionise customer service. Hotels, airlines, and other significant participants in the travel sector would be able to run on their own, even in the absence of workers, thanks to artificial intelligence (AI).

The future is in the hand of technologies, in context to India AI technology has a huge scope in the areas of travel and tourism for improving the services and enhance the experience of the customers. Artificial Intelligence has the power to change an entire hotel residence into a desirable tourist spot, not only this it can also transform the rooms of the guests according to their choice of their favourite destination spots. This can be created by the 3D virtual world technology; this will create a 3D view of the chosen destination spot inside the room. This kind of technology is not available in India right now, but if brought in India will be a huge success.

Facial recognition technologies have a huge benefit because of it hassle-free check-ins, recently there might some issues regarding the privacy and security of data but with the upcoming technologies this problem will be solved and it can be used widely across the country. The robotics in India has a huge scope and appreciation, a robot as a waitress used in a restaurant in Gujarat was a huge success as well as attracted customers throughout the country, therefore robots in the hospitality of tourism could make a huge difference in the experience of the customers which will eventually attract the customers towards it.

As Google Maps introduced the VPS i.e. Virtual Positioning System, this could eventually take over the GPS i.e. Global Positioning System. Because VPS is an advance technology which provides virtual landmarks to the user. In country like, India VPS could be more useful than GPS because in the cities of India there are many small streets which leads to confusion and certainly turns to be the wrong location.

If these technologies are implemented in India there will be certainly a growth in economy as well as it would be sustainable. Looking towards the earning of the year 2019 from tourism in India is Rs. 211,661 crores (30,058 US$ million), that is 8.6% more than 2018's, this will eventually grow and also the tourist engagement will increase more about 6 -7% by 2022, the tourist engagement in the year 2019 was 10.93 million, that is 3.5% more than 2018's. Also, to boost the tourism in India more schemes like, '*DekhoApnaDesh*' are required by the side of the Indian government.

Thus, considering all the above AI technologies, if implemented in India without a doubt it will be a huge success for the tourism industry and well as for other industries also.

9. FINDINGS

- Firstly, AI has the power to change the entire system of Indian Tourism sector.
- If the implementation of artificial intelligence done properly by the year 2028, the Indian economy will be certainly enhanced and there will be increase in GDP by 9.9%.
- It also can be projected that the medical tourism sector to grow by US$ 10 - 11 billion by 2023.
- It can also be predicted that by the year 2022 there will be 6% to 7% growth in the tourist engagement in the country.
- In the FY20, 39 million jobs were created in the tourism sector of India, thus it can be clearly predicted that nearly about 50 million jobs will be created by next five years, i.e., by 2025.
- By the year 2023, the AI technologies will be in action in India and will grow by 10%.

CONCLUSION

Considering all the above notes, insights and facts it has been seen that the execution of Artificial Intelligence technology is increasing day-by-day, it could be figured out that the tourism industry will hit its unimaginable peak in the future with the implementation of AI technology. It is expected that by the year 2023 AI technology will grow over nearly 10 percent, and the major growth will be in the travel and tourism industry. Considering the rise of artificial intelligence in the tourism sector, it is expected that more job opportunities will be created, nearly 58 million job opportunities will be created by the year 2022, globally. Thus, it can be said that many unemployment problems of India will be dealt.

Artificial Intelligence technologies have become such important in the tourism sector that they are leaving a significant mark in the industry, due to this technology the industry has been improved in efficiency and productivity. The level of customer satisfaction is reaching its heights because of this advancement. Sooner the business process and also the tourism process will be fully automated, which will certainly bring up a huge revolution in the industry.

In country like India, being a developing country, the technological advancements are must because of this advance technology the country is going to grow economically as well sustain-ably. Also, the tourism sector of India is increasing day-by-day, therefore, implementation of such technologies are very profitable in monetary terms as well as for the guests. Thus, artificial intelligence in the tourism sector of India has a huge scope to establish itself as a benchmark for the industry.

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326

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327

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332

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334

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342

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344

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346

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348

Index