Promoting Inclusivity and Diversity Through Internet of Things in Organizational Settings

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to radically change today's business life and economic institutions. The internet of things, a brand new business for businesses, is therefore a harbinger of its enormous returns. The concept of IoT is especially exciting for businesses and managers in the field of marketing. Businesses that have to adapt to the developing and constantly changing technology have to adapt their marketing activities and strategies to changing customer requests and demands with the internet of things. This study examines the way things are applied in the internet of things and enterprises with its conceptual content and aims to raise awareness about internet of things technology in enterprises.

The COVID-19 crisis provides a novel perspective for studying a pre-existing issue of the gender digital divide. This chapter examines the literature on women's digital economic participation during the pandemic. A systematic literature review (SLR) of 20 peer-reviewed papers from various social sciences, encompassing the COVID-19 period of 2019 to early 2022, was conducted. The discussions surrounding the impact on women's migration to work from home are extended across the three key levels from which digital inequalities emerge: (1) digital accessibility, (2) digital literacy, and (3) family role. The prevailing narrative in the reviewed publications revolves around women's unpaid care labor during the pandemic, the primary cause of the remunerated time decrease and productivity. Overall, the findings suggest that digital inequality is embedded in societal structural inequalities; thus, it is crucial not to let the overemphasis on digital accelerations leave behind the deep-seated challenges of women's digital inclusion amidst diverse roles.

As the digital era unveils, it has become a must for many business firms to redesign their existing business processes to utilize the frontier technologies to become competitive. However, "digital transformation" has received less attention in prior literature, and no clear pathway to a successful digital transformation has been provided. This chapter builds on 12 in-depth interviews with top-level decision-makers of Sri Lankan business firms to develop a digital transformation model. The findings reveal that the solid foundation of a digital business firm relies on a "digital-first" mindset and three success pillars reflecting unique organizational characteristics

Preface

The Internet of Things (IoT) is rapidly becoming one of the most important segments of the technology industry. As smart devices become more common in consumer and business industries, experts predict that worldwide IoT spending will exceed $1 trillion by 2022. As the industry matures, more attention is being paid to how it manages diversity and inclusion. For many years, diversity has been a stumbling block for technological firms. As a relatively new industry, the IoT offers an opportunity to buck the trend as it develops. Numerous IoT firms, thankfully, have demonstrated a commitment to diversity and inclusion. The IT sector will become more inclusive as more enterprises adopt these initiatives.

In domains such as health, education, and urban transportation, the internet of things (IoT) has already demonstrated its significance. Given the fast growth of IoT, AI, and machine learning in recent years, it is expected that new generation technology will drastically transform how we live and work. The realm of business diversity and inclusion is one area where this paradigm may stand out in the future. IoT may identify probable bias and prejudice in decision-making by modelling intelligent behaviour, thereby reducing tendencies and prejudices that stifle a company's ability to attract a diverse and inclusive workforce

Despite past issues with diversity, IT industries such as the Internet of Things require it. Bringing in people with different ideas and experiences will help to foster innovation and encourage more ethical tech governance. As the Internet of Things grows in popularity, a commitment to improving workplace diversity may help propel it forward. Many, IoT firms have taken steps to promote diversity and inclusion, but there is still much more to be done. Progress will take time, but the IoT sector may contribute to a more egalitarian future if enough effort is put into these areas.

Promoting Inclusivity and Diversity in Organizational Settings presents key theoretical frameworks as well as the most recent empirical research findings in the field. It investigates the empirical evidence on companies and how the Internet of Things is being utilised to promote inclusivity and diversity through electronic means. This outstanding reference source, which covers issues such as occupational stress, digital transformation, and digital diversification, is a valuable resource for

company executives and leaders, human resource managers, IT managers, social workers, sociologists, researchers, and academics. The many academic areas covered in this book include, but are not limited to:

- Artificial Intelligence
- Corporate Sustainability
- Digital Diversification
- Digital Leaders
- Digital Transformation
- Diversity, Equity, and Inclusion (DEI)
- Financial Technology (FinTech)
- Innovation Management
- Institutional Diversity
- Mobile Payment Adoption
- Occupational Stress
- Robotics Technology

This book uncovers new and innovative features of IOT and how it can help in promoting inclusivity and diversity for 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 Artificial Intelligence, Corporate Sustainability, Digital Diversification, Digital Leaders, Digital Transformation, Diversity, Equity, and Inclusion (DEI), Financial Technology (FinTech), 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.

This book is a solid step forward. The theme of the book is very much inter-disciplinary in nature. Although focused on the Stakeholder Strategies, the book will be great use for the people in Corporate, Business Professionals, Sociology, Political Science, Public Administration, Mass Media and Communication, Information system, Development Studies as well to the 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. 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 analysed is highlighted thus facilitating 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 resolution of typical problems in area of study. The key concepts and summarized content of the chapters will enable the reader to absorb contents at glance

Chapter 1 talks about "Artificial Intelligence Application Framework in Performance Appraisal." It is the era of data and Artificial Intelligence (AI). They changed the way we did work, lived life, and even thought. It is a crucial time for companies to retain employees and hire new, talented employees. AI can help in doing the same. There's no doubt that AI technology has changed HR practices, and this change has accelerated since the beginning of the COVID-19 pandemic. HR (Human Resource) managers use AI, and it's helped them make less biased, accurate, and data-supported decisions in all performance management process. In this paper, we discuss organizational justice and its role in performance appraisal. Furthermore, performance appraisal satisfaction and how AI supports performance appraisal are discussed. A conceptual framework has been used to show the relationship between AI technology applications and performance appraisal functions. All in all, we are trying to help organizations and scholars understand how AI technology practices change performance appraisal.

Chapter 2 talks about "Use of Internet of Things Technology in Organizations: Promoting Inclusivity and Diversity Through Internet of Things in Organizational Settings." Expressing the platform on which all existing objects can connect with each other and through some technologies with the Internet, Internet of Things / IoT is thought to radically change today's business life and economic institutions. The Internet of Things, a brand new business for businesses, is therefore a harbinger of its enormous returns. The concept of IoT is especially exciting for businesses and managers in the field of marketing. Businesses that have to adapt to the developing and constantly changing technology have to adapt their marketing activities and strategies to changing customer requests and demands with the Internet of Things. This study examines the way things are applied in the Internet of Things and enterprises with its conceptual content and aims to raise awareness about internet of things technology in enterprises.

Chapter 3 talks about "Working Women's Digital Inclusion (Exclusion) During the COVID-19 Pandemic and Beyond: A Literature Review." The COVID-19 crisis provides a novel perspective for studying a pre-existing issue of the gender digital divide. This chapter examines the literature on women's digital economic participation during the pandemic. A systematic literature review (SLR) of 20 peer-reviewed papers from various social sciences, encompassing the COVID-19 period of 2019 to early 2022 was conducted. The discussions surrounding the impact on women's migration to work from home are extended across the three key levels from which digital inequalities emerge: (1) digital accessibility; (2) digital literacy; and (3) family role. The prevailing narrative in the reviewed publications revolves around women's unpaid care labor during the pandemic, the primary cause of the

remunerated time decrease and productivity. Overall, the findings suggest that digital inequality is embedded in societal structural inequalities, thus it is crucial not to let the overemphasis on digital accelerations, leaving behind the deep-seated challenges of women's digital inclusion amidst diverse roles.

Chapter 4 talks about "The Journey Towards Harnessing Frontier Technologies: Becoming a Digital Firm With Digital Capability and Dexterity." As the digital era unveils, it has become a must for many business firms to redesign their existing business processes to utilize the frontier technologies to become competitive. However, "digital transformation" has received less attention in prior literature, and no clear pathway to a successful digital transformation has been provided. This chapter builds on 12 in-depth interviews with top-level decision-makers of Sri Lankan business firms to develop a digital transformation model. The findings reveal that the solid foundation of a digital business firm relies on a "digital-first" mindset and three success pillars reflecting unique organizational characteristics (e.g., digital business transformation strategy, workforce, and firm resources) that collectively enable digital capability and dexterity. This chapter further argues that digital capability and dexterity are the critical hallmarks of a truly digital firm in a digital economy where technologies continue to improve exponentially.

Chapter 5 talks about "Perceived Security Risk, Perceived Privacy Risk, and Perceived Trust of Mobile Payments Adopters and Non-Adopters: Impact of COVID-19 Pandemic." With the COVID-19 pandemic, people have shifted to mobile payments enormously. However, cyber threats have increased simultaneously. Therefore, this paper aims to investigate the dichotomous perceptions regarding mobile payments privacy, security, and trust within the adopter and non-adopter groups. An online survey was carried out among university students in Sri Lanka to collect the data. The Independent samples test and the robust bootstrap methods were used to test the differences between adopters and non-adopters perceptions of mobile payments' privacy, security, and trust. The adopters have significantly higher perceived trust in mobile payments than the non-adopters. Further, adapters are twofold according to the usage level; the advanced users and the laggards. This chapter provides unique and comprehensive insights into mobile payments user and non-user segments in Sri Lanka and the dichotomous nature of contactless payments' trust and risk perceptions. The findings will help banks design their marketing campaigns that suit the available customer segments in the market.

Chapter 6 talks about "Organizational Changes and Leadership Suitability: A Study of Institutional Diversity in Educational Institutions." Implementing diversity agendas at dispersed, loosely connected, and change-resistant institutions such as colleges and universities is a global concern. To create the essential transformation for a diversity agenda to thrive, a shift in the organisational environment and culture is required. Higher education experts have long recognised leadership styles as one

of the most essential contributing aspects to successful institutional transformation and specifically during technological time (IoT), particularly when it comes to diversity agenda initiatives. This chapter reviews the literature on various types of diversity agendas, change paradigms due to change in technology, and leadership styles by synthesising data from 10 case studies on successful strategies and providing implications for how diverse leadership styles might be employed to fuel institutional diversity effort.

Chapter 7 talks about "Management of Digital Innovation." Digital technologies are putting tremendous pressure on businesses to renew and transform their business models. The transformation of business models using digital technologies will lead the businesses to innovate themselves digitally. To improve operational efficiency, customer engagement, and launch successful new products, every organization must innovate. The application of new digital technologies to solve existing business problems and improve organizational practices is known as digital innovation. Digital innovation has become critical to the long-term viability and growth of businesses. To stay relevant and competitive, any company aiming for long-term success should embrace digital innovation. This paper tries to find out the existing definitions of digital innovation from socio-technical perspectives viz product, service, process, digital system, organizational innovation and business models and tries to develop a framework to organize digital innovation research.

Chapter 8 talks about "Impact of Occupational Stress and Job Burnout on Health of University Teachers." It is observed that occupational strain and work stress affect directly on well-being of university educators. Burnout is one in which an individual feels an emotional, physical, and mental exhaustion carried by life-threatening and prolonged stress. As the stress continues, they start losing the interest and motivation and, it also causes illness to their body that make them vulnerable. We wanted to present a thorough overview of research that looks at theoretical correlations among stress in addition extra variable quantity in direction toward what remains recognized (in addition what isn't) around the reasons and effects of burnout among university professors, as well as how this connects to burnout theories. These research' findings repeatedly suggest that undesirable employment characteristics—such as a heavy workload—have a negative impact, negative work environment, less salary and work intensity are having a positive correlation with work stress, health of Academia Educators.

Chapter 9 talks about "Corporate Sustainability and Internet of Things (IoT): Benefits, Drawbacks, and Challenges of Internet of Things (IoT) With Corporate Sustainability." The Internet of Things (IoT) has become a vital component in the effort to achieve net-zero emissions. When it comes to transforming into sustainable resources the combination of green technology and renewable energy are the reliable resources that are increasingly being acknowledged by global business leaders. The

IoT is a trend that is shaping future innovations. Business from every industry is using IoT to create ways for sustainability and to reduce energy waste. IoT projects that are truly transformational can have a significant beneficial influence on sustainability in Corporates. The most important purpose of IoT technologies is to make procedures simple in various domains in order to improve the efficiency of the system. Implementation of IoTs incorporate is not easy but to achieve sustainability targets in business IoTs is a preferred choice. Through this chapter, the author will get to know how IoT technology drives sustainable development in corporate, Approaches to gaining user trust in internet-connected gadgets with Benefits & Drawbacks of IoT.

Chapter 10 talks about "Digital Diversification and Use of New Age Technologies on FinTech Firms." FinTech firms and innovative financial service providers are delivering a wide range of new financial products, financial businesses, financial software, and novel forms of customer communication and interaction. As a result, a study on new business models and technological applications can aid in examining changes and the effects of technological advancement on the financial industry. The study aims to review the current state of the Indian financial technology market and addresses the technological changes with its application in different fintech segment. It also provides an outlook on potential future trend in fin-tech market in India. Therefore, this paper offers a coherent research theme formulated through systematic literature review and industrial report data. The study found that financial service innovation needs to be understood under the convergence of new age technology. Additionally, Account aggregator, embedded services and Neo banks are the trend coming up in Indian Fin-Tech market.

Chapter 11 talks about "Digital Transformation and Innovation Management: A Systematic Literature Review." Digital innovation is the creation and commercialization of novel products and services while digital transformation indicates the combined effects of several digital innovations by novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations and fields. Since Innovation processes themselves are subject to digitization, scholars have argued that accepted theories of innovation are no longer applicable, and hence, there is a significant need for novel theorizing and empirical research on digital innovation management.

Chapter 12 talks about "HR 4.0 Exercise: Post-COVID-19 Scenario." The coronavirus pandemic before and after COVID-19 has adversely affected the private sector in building the economy. And private organizations and the people working in them have been harshly affected both in the time and post-COVID-19, with delicately facing conflicts in personal and professional life. The pandemic of COVID-19 has rapidly developed into a worldwide monetary emergency with the health of employees and is spreading to the real sector in addition to posing a developing threat to the monetary structure. Since in delicate and conflict-affected circumstances the difficulties related to the pandemic have to be faced on top of

the significant difficulties currently working in the private sector. COVID-19 has affected the health of employees mentally and physically socially, publicly, personally, and professionally.

Chapter 13 talks about "Impact of the COVID-19 Pandemic on Financial Inclusivity of Women in India." Financial inclusivity of women during pandemic has been discussed and analyzed. During COVID-19 the usage of cashless transactions has increased enormously. This chapter will discuss the challenges which women have faced while doing transactions in a cashless manner. For this a constructive model for the same has been developed by the researchers in order to explain the impact of COVID-19 on financial inclusivity of women specifically for cashless transactions. For this following objective have been examined and a probable discussion on the same has been concluded: 1) To check the effectiveness of government plans and awareness schemes of financial inclusion for women. 2) Coping with the challenges of technology handling and financial literacy among women and finally 3) To realize the overall effect of financial inclusion on financial well-being and empowerment of women. This chapter will also present its argument on the implication and discussion of steps on financial inclusivity.

Chapter 14 talks about "Robotics Technology in Tourism and Hospitality Sector in the Wake of the COVID-19 Health Crises." During the global pandemic, the worldwide tourism and hospitality sector has affected severely and robotics can be a good instrument for providing significant physical distance during the epidemic as humans avoid physical interaction. In this article examination has been performed whether it would be helpful or whether it will have adverse effects on using robotic systems to offer physical distance for the tourism and hospitality sector. The article further revealed that robotics technology builds a technological wall among tourists and staff, enhancing physical and emotional distance between them. Therefore, tourism and hospitality businesses need to augment robots with other technologies to promote social interaction and counteract the adverse consequences of complete distance.

Thus, this book intends to give a quality publication with unique insights and methods of application for current scholars and user. This book offers a great overview of how IoT and Artificial Intelligence (AI) transforms organizations and organizes innovation management by promoting inclusivity and diversity.

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Chapter 1
A Conceptual Artificial Intelligence Application Framework in Performance Appraisal

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ABSTRACT

It is the era of data and artificial intelligence (AI). They changed the way we did work, lived life, and even thought. It is a crucial time for companies to retain employees and hire new, talented employees. AI can help in doing the same. There's no doubt that AI technology has changed HR practices, and this change has accelerated since the beginning of the COVID-19 pandemic. HR (human resource) managers use AI, and it's helped them make less biased, accurate, and data-supported decisions in all performance management process. In this chapter, the authors discuss organizational justice and its role in performance appraisal. Furthermore, performance appraisal satisfaction and how AI supports performance appraisal are discussed. A conceptual framework has been used to show the relationship between AI technology applications and performance appraisal functions. All in all, they try to help organizations and scholars understand how AI technology practices change performance appraisal.

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INTRODUCTION

HR managers need to undertake performance reviews to assess their employees' effectiveness and ability to accomplish business goals (Richards et al., 2019; Kakkar et al., 2020). Undoubtedly, it is a crucial time for companies and businesses to survive and keep growing in today's market. AI is part of software engineering tries to replace humans with machines (Lee et al., 2018; Brooks, 1991; Schank, 1987). Technology is changing organizations day-by-day. Today's businesses are using AI in different departments, from marketing to HR (Strohmeier and Piazza, 2015; Tewari and Pant, 2020; Bhardwaj et al., 2020).

Data is the backbone of AI, and scholars assumed HR was the department that was not as data-driven as other departments (Davenport, 2014). Despite that barrier, different companies have released software that enables organizations to use AI in HR functions and even for companies that can't generate big data (Cheng and Hackett, 2021). AI technology has the potential to eliminate repetitive tasks, help in making decisions, and perform some tasks that require decision-making. Since the start of the COVID-19 pandemic, organizations have accelerated their use of AI.

This study examines how the performance appraisal model is impacted by the usage of AI, so a conceptual framework has been used to illustrate the relationship between AI technology applications and performance. In this paper, we are trying to help organizations and scholars understand how AI technology practices change performance appraisal systems and update your knowledge regarding recent application of AI in HR practices.

The subsequent part of this paper discusses the relevant theoretical literature. The third part presents the conceptual framework model, and the final section is the conclusion.

BACKGROUND OF THE STUDY

Performance Management

Performance is considered as an outcome of activity, particularly job function, at a specific time (Bernardin and Beatty, 1984). Different scholars define performance management differently. Mohrman and Mohrman (1995) define performance management as a tool for managing business. Walters (1995) defines performance management as a process which directs and supports employees to achieve as high as possible work efficiency and effectiveness. Aguinis, in his book "Performance Management for Dummies", defines performance management as a continuous process that aims to identify, measure, and develop performance (2019).

Performance Management's Ultimate Goal

According to Armstrong and Baron (2005), the aim of performance management is to get the best from employees by giving rewards, empowering them, and motivating them. In crisis situations like COIVD-19, companies halted their previous performance management practices, and the reason is clear: they can't measure performance or even set goals for employees. Performance management does not serve as an administrative function, but it is also important for maintaining communication and supporting personal and talent management decisions (Aguinis, 2019).

Performance Appraisal

It is the need for organizations to review and evaluate the performance of employees (Ghorpade and Chen, 1995; Jafari et al., 2009). Basically, performance appraisal is a process of rating that involves line managers reporting on a subordinate's performance (Fletcher, 2001). Different scholars define performance appraisal differently. Aguinis (2014), in his book "Performance Management (3rd ed.)", elaborated that performance appraisal is showing the strength and weaknesses of an employee in a systematic description; another scholar defined performance appraisal as the process of employee evaluation to reach objective personnel decisions (Robbins et al., 2000).

Performance Evaluation's Ultimate Goal

According to Beer (1981), organizations are pursuing three goals in conducting performance appraisals, which are: feedback for subordinates, data-supported decisions in terms of salary and bonus, and helping managers take decisions on the lay-off or retention of employees. Additionally, some other scholars who worked for performance appraisal purposes have been emphasized as raters (Boswell and Boudreau, 2002). Currently, performance appraisal provides a formal and structured interaction between subordinates and managers (Koshy and Suguna, 2014).

Thine Line: Performance Management and Appraisal

Separately, we discussed performance management and appraisal, so here we would like to elaborate on the differences between the two. In basic terms, performance appraisal is a key part of performance management, which means performance appraisal is part of a bigger concept, which is performance management (Aguinis, 2014). Halachmi (2005) believes that performance management can cover different activities, from dealing with issues internal to the organization to handling issues in its environment, and considers performance appraisal under performance management. What is Artificial Intelligence?

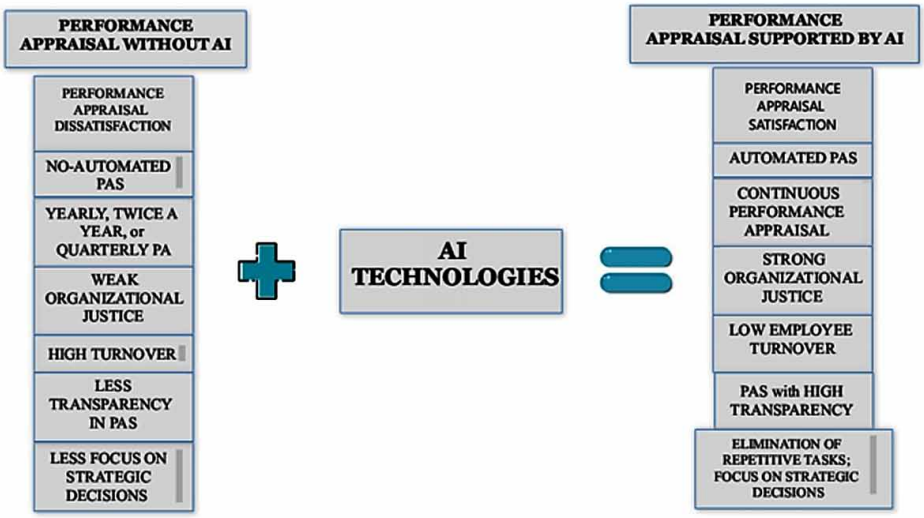
For the first time, John McCarthy coined the term "artificial intelligence" (AI) (Lee et al., 2018). McCarthy (2007) defines AI as "the science and engineering of making intelligent machines, especially intelligent computer programs." It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable "(p.2). The main purpose of AI is to replace humans with machines in non-repetitive tasks (Brooks, 1991; Schank, 1987).

Since a long time ago, people have shown their concern about AI and automation (Wang, 2013; Jin, 2017; Autor, 2015). Despite these concerns, organizations have tried to adopt these technologies.

People believe that some complex tasks that require high-level cognitive abilities will not be replaced by machines. By considering recent progress in AI and other technologies, we can tell that many complex tasks like disease detection are currently being done by machines (Wright and Schultz, 2018; Manyika et al., 2017).

Currently, everything from HR strategic planning, recruitment, training and development, to compensation management is using AI (Jia et al., 2018; Upadhyay and Khandelwal, 2018; Geetha and Bhanu, 2018; Tambe, 2019). In short, we can say that all HR functions can be supported by AI.

Figure 1. A conceptual model for artificial intelligence application in performance appraisal
Source: Author



CONCEPTUAL FRAMEWORK: AI APPLICATION FOR PERFORMANCE APPRAISAL

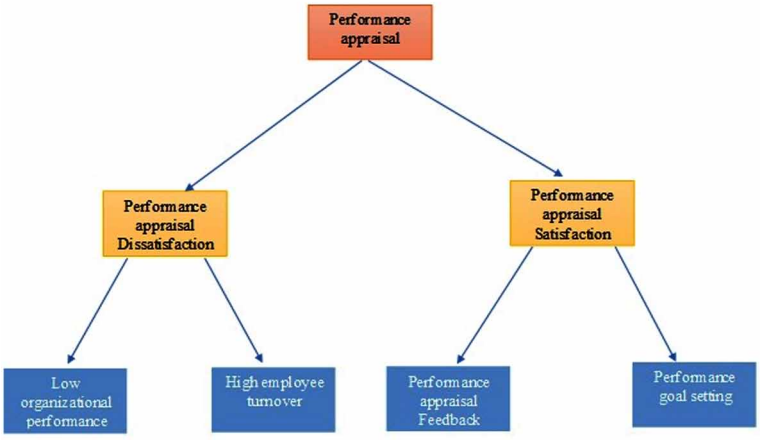
Performance Appraisal Satisfaction

Employee performance and performance appraisal have a positive and robust relationship, though it is complex to measure the relationship between feedback and goal setting with employee performance (Kuvaas, 2006; Kluger and DeNisi, 1996; Locke and Latham, 2002; Roberts and Reed, 1996; Ellickson and Logsdon, 2002). Furthermore, some scholars suggest that dissatisfaction with performance appraisals will lead to low organizational performance and high employee turnover (Rahahleh et al., 2019; Kim & Holzer, 2016). Nowadays, HR managers are trying to align HR activities with organization policies, which means that managers have found the crucial role of performance appraisal in strategic decisions and the growth of organizations (Daoanis, 2012; Fletcher, 2001). Figure 2 shows the two sides of performance appraisal. Furthermore, the below figure elaborates on the effect of performance appraisal dissatisfaction and satisfaction.

Organizational Justice, Performance Appraisal and AI

Organizational justice is the most concerning issue for employees and has a direct impact on the effectiveness of performance appraisal (Byrne & Cropanzano, 2001; Warokka et al., 2012). The importance of organizational justice is supported by

Figure 2. Framework for performance appraisal dissatisfaction and performance appraisal satisfaction
Source: Author

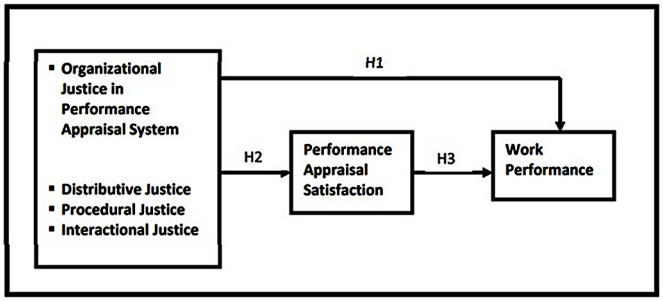


research done in Malaysia, which shows that fairness in performance appraisal will lead to higher job satisfaction and lower employee turnover (Fatt et al., 2010). A number of scholars have proposed three components for organizational justice: distributive justice, procedural justice, and interactional justice (Skarlicki and Folger, 1997; Blodgett et al., 1997; Beugre and Baron, 2001; Martínez-Tur et al., 2006). The factors used in the above are depicted in Figure 3. Some of them are dependent variables and a few are independent variables. Work performance can be considered as a dependent variable, while organizational justice, which is further divided into three different categories, which are distributive justice (Cook and Hegtvedt, 1983), interactional justice (Blodgett et al, 1987), and procedural justice (Solum, 2004), can be considered as an independent variable. Distributive justice is about the fairness of the allocation of different organizational resources like wages and rewards (Blodgett et al., 1997; Roch et al., 2019). But procedural justice emphasizes procedure, policies, and criteria for justice (Lind and Tyler, 1988; Alexander and Ruderman, 1987). Eventually, interactional justice is about fairness in treatment (Bies and Moag, 1986; Bies, 1987).

Performance appraisal has a positive and strong relationship with work engagement and work performance. Furthermore, work engagement can predict employee turnover (Memon et al., 2019; Gupta and Kumar, 2012; Kuvaas, 2006). All in all, in order to have employees with good work engagement, work performance, and low employee turnover, we need to have an effective and efficient PAS. Consequently, it leads to organization growth, which is the main aim of an organization.

Almost all business practices have been empowered by AI, and it is needed to survive in a VUCA world (Ertel, 2018). Since the beginning of COVID-19, scholars

Figure 3. Impact of organizational justice on performance appraisal satisfaction and work performance
Source: (Warokka et al., 2012)



have suggested different ways to conduct performance appraisals in organizations (Aguinis and Burgi-Tian, 2021). But at the same time, some authors suggested not conducting a performance appraisal (Janove, 2020). Intelligent systems can positively impact performance appraisal, automate the process, increase transparency and also reduce costs (Shanmugam and Garg, 2015). AI is able to provide analysis on achievements and failures, suggest new indicators, and reduce bias in PA (Jia et al., 2018; Gaur et al., 2019).

Continuous Assessment and AI

According to Deloitte Development LLC (2017), continuous performance management is an approach that enables managers, direct reports, and teams to have ongoing conversations about goal setting and an employee's performance to date. It means employees have immediate feedback, which leads to better performance (Willem & Neerincx, 2016; Williams and Beck, 2018). Continuous performance appraisal is adopted in a number of organizations (McElgunn, 2019). And this number has been increasing since the start of the COVID-19 pandemic.

AI in performance appraisal needs continuous data from employee activity and not just that but also feedback from different stakeholders to give insights on an employee's tasks, achievements, and improvement level, and also suggest future improvements (Bharanidharan, 2020). Data from different stakeholders can be extracted from email amongst colleges by using data mining (Use of Artificial Intelligence in Performance Reviews, nd). Additionally, Voice of the Employee (VOE) and chatbots can be used to boost engagement.

Figure 4. Continuous Performance Management: An Overview of a Typical Approach
Source: Deloitte, 2017.

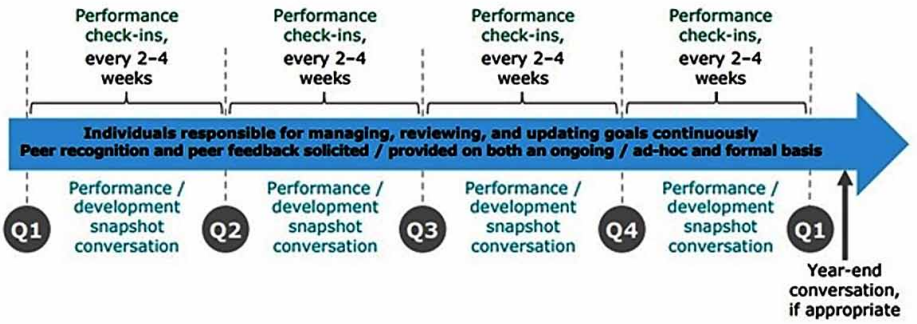


Table 1. A summary of the main publications

Authors	Title	Year	Result
Jia, et al.	A conceptual artificial intelligence application framework in human resource management	2018	AI helps to take less biased decisions, continuous feedback
Bhardwaj, et al	An empirical study of artificial intelligence and its impact on human resource functions	2020	AI automats the tasks
Langer, M. and Kӧnig, C. J.	Explainability of artificial intelligence in human resources	2022	Examining bias-free Machine learing, negative reaction of applicant and users
Haidari, M. and Chhibber, P.	Artificial intelligence and human resource management: a conceptual framework	2022	AI changes HR practices, main challenges are lack of skill, cost, and accuracy
Chakraborty, et al.	Evaluating influence of artificial intelligence on human resource management using PLS-SEM (Partial least squares-structural equation modeling)	2020	AI helps to take less biased decisions, continuous feedback, and easy data collection
Alrashedi and Abbod	The effect of using artificial intelligence on performance of appraisal system: a case study for University of Jeddah Staff in Saudi Arabia	2020	Use of AI positively affect performance appraisal
Makarova et al.	Development of an Intelligent Human Resource Management System in the Era of Digitalization and Talentism	2019	AI automates repetitive tasks, continuous feedback, fast data collection, and less bias
Mahmoud, et al.	New Thinking of Human Resource Management in the Age of Artificial Intelligence	2018	AI helps in decision making, faster collected data
Sajjadiani et al.,	Using machine learning to translate applicant work history into predictors of performance and turnover	2019	Using ML algorithms, they found that history of avoiding bad jobs was associated with negative outcomes, and approaching better jobs were linked to positive work outcomes

Source: Author.

Main Challenges: Implementing AI in Performance Appraisal

Though we count the number of implementations of AI technology in HR and specifically in performance appraisal, there are some drawbacks (Williams et al., 2021). One of the main challenges is that AI technology still needs humans in decision making (Bolander, 2019).

Secondly, lack of explainability is another problem, and most of the time we cannot explain AI decisions (Bolander, 2019; Pugna et al., 2018). The HR department is a human-oriented department, so it is difficult for AI to human-like understand and respect employees (Jiang et al., 2019). So in reasoning, AI has mentioned some drawbacks, which can raise ethical issues also (Cappelli et al., 2019).

When we collect data, it is not possible to contextualize the data. De-contextualization, consequently, can impact the performance of the individual and the organization (Pugna et al., 2018).

Lastly, the fundamental problem is that human cognitive and decision-making, which is highly essential in the field of HR, is not comparable to AI. Furthermore, transparency, cost, lack of skill in organizations, bias, not-expandability are major challenges in front of AI implementation (Haidari and Chabber, 2022).

Implications and Future Direction of the Research

Despite the fact that AI in PMS is a hot research area, there is little academic research available (Buck and Morrow, 2018; Sivathanu and Pillai, 2018; Gulliford and Parker Dixon, 2019). Current study is possibly the first conceptual study that tries to show a relationship between performance appraisal and AI. This research is beneficial for company executives, HR professionals, machine learning software engineers, talent managers, and HR analytics. First of all, I considered some problems that typically occur in performance appraisals. These problems are, for example, performance appraisal dissatisfaction, implementing performance appraisals during crises like COVID-19, and high turnover. People can use this study to find the recent studies that have been done in this area.

COVID-19 places HR professionals in a quandary about whether or not to conduct performance appraisals (Aguinis and Burgi-Tian, 2021). This research has proposed AI to solve this problem. I accept that all organizations do not have the required human capital or technology to use AI in performance appraisal, but a number of organizations have.

Transparency in performance appraisal is critical and directly related to organizational performance (Ostroff, 1992; Jacobs, 2003; Dobre, 2013). Though scholars and practitioners have tried to minimize bias in conventional performance appraisal, there are still a number of objections. AI seems to provide a solution to this. Transparency and bias are increased by automating performance evaluation and reducing human intervention.

CONCLUSION

In this study, I have tried to explain the use of AI in performance appraisal and its impact on performance management. AI has helped HR practitioners make less biased, accurate, and data-supported decisions in all performance management processes. In this paper, we discussed organizational justice and its role in performance appraisal. It was clear that AI had improved transparency and, to some extent, eliminated bias. Furthermore, this technology can improve performance appraisal satisfaction by reducing human intervention and measuring the performance accurately. Continuous performance appraisal and simultaneously providing feedback is a distinct feature of AI in performance appraisal. AI enables HR managers to focus more on strategic decisions than repeated tasks, support their decisions with data, reduce bias, and increase performance appraisal satisfaction. Using AI technology in performance appraisal practices is increasing day by day, and COVID-19 has accelerated the same since 2020.

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Chapter 2
Use of Internet of Things Technology in Organizations:
Promoting Inclusivity and Diversity Through Internet of Things in Organizational Settings

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ABSTRACT

Expressing the platform on which all existing objects can connect with each other and through some technologies with the internet, internet of things (IoT) is thought to radically change today's business life and economic institutions. The internet of things, a brand new business for businesses, is therefore a harbinger of its enormous returns. The concept of IoT is especially exciting for businesses and managers in the field of marketing. Businesses that have to adapt to the developing and constantly changing technology have to adapt their marketing activities and strategies to changing customer requests and demands with the internet of things. This study examines the way things are applied in the internet of things and enterprises with its conceptual content and aims to raise awareness about internet of things technology in enterprises.

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INTRODUCTION

The purpose of technology for businesses; flexibility, efficiency, quality, speed, agility, sustainability and "profitability" in the sum of all this. Technologies that come into our lives with digitalization; it allows to prevent errors that may occur in operations and business processes and to obtain the data more easily and analyze it in a practical way. Digitalized businesses create sales opportunities by providing measurable data to their customers by digitizing documents. In addition, businesses can increase their market share in their campaigns and gain new customers through online channels. Artificial intelligence and internet of things technologies are innovatively forming the infrastructure of the operations that provide all these benefits.

Artificial intelligence is defined as "systems or machines that mimic human intelligence to perform tasks and can recurally improve themselves according to the information they collect." The history of artificial intelligence dates to the 20th century and works with the principle of mimicking and transcending how people perceive and react to the world.

Artificial intelligence applications: it has become a strategic element for all businesses looking to achieve new revenue opportunities and a higher level of customer loyalty.

Businesses thanks to artificial intelligence (AI);

- To be able to reduce business risks and make more accurate and effective decisions,
- AI will be able to get the most out of the data and gain a competitive advantage by having a more comprehensive understanding of much more data,
- Data discoveries that are manual in business processes can automate complex or usual tasks,
- Affordable, high-performance computing power is easily accessible,
- Increase the value of existing workforces,
- With the easy working model that artificial intelligence will bring, they will be able to increase the opportunities of their employees and make them suitable for more strategic tasks.

One of the most important concepts of digital transformation is internet of things technology. The Internet of Things is defined as "technologies to enable all imaginable objects to access the Internet and communicate with other devices". Internet of Things applications can transfer data through any interrelated object through a network provided with unique identifiers (UIDs). Organizations in various industries use IoT technology to provide better customer service, improve decision-making, and increase the value of their business.

Thanks to internet of things (IoT) technology, businesses;

- Be able to monitor all business processes in detail,
- To be able to improve the experiences of its customers,
- Save time and money, provide quality and flexibility in their processes,
- Be able to earn more income by making business decisions more accurately,
- To be able to carry out planning and management processes effectively,
- Be able to monitor and manage their presence in the supply chain,
- They will be able to facilitate the monitoring of their operations, productions, services or employees.

Reducing costs for enterprises and increasing efficiency and quality standards have become the top priority in today's economic conditions. Industry 4.0 transformation with IoT technologies and the creation of digital twins of enterprises make it easier to manage processes more effectively and make decisions easier.

Trio Mobile IoT Platform was developed using the latest technologies with AI-powered big data infrastructure. The IoT Platform allows you to manage 10 different modules with a single infrastructure and panel, from personnel and forklift tracking to energy monitoring, machinery and production tracking to predictive maintenance. In summary, Trio Mobil offers products and IoT solutions that add value to businesses to take advantage of industry 4.0 transformation.

This study examines the way things are applied in the Internet of Things and enterprises with its conceptual content and aims to raise awareness about internet of things technology in enterprises.

INTERNET OF THINGS CONCEPT

The concept of the Internet of Things was first used by Kevin Ashton in a presentation on the benefits of Radio Frequency Identification (RFID) technology for P&G in 1999 (Ashton, 2009).

Especially the technological studies that we have witnessed for the last quarter of a century, the number of which we do not know; It is involved in many areas such as our work life, habits, home life. The remote-control technology we use for our air conditioning, television or vehicle doors expresses nostalgic functionality and the innovative applications developed by the industry make our lives easier and save us time. Thanks to the versatile technology that comes into our lives with the Internet of Things, our physical relationship with devices is also changing day by day.

The Internet of Things is defined as "The ability of objects in daily use to send and receive data by connecting to the Internet".

Literature research on IoT have been carried out, these studies and their targets are presented in detail in Table 1.

Internet of Things technology, where machines collect information and make decisions with the information collected through data communication among themselves without the need for human intervention, takes living standards to an easier level.

Table 1. Literature research on IoT

Article Title	Subject	References
The Internet of Things: A survey	The authors discussed IoT co-enabled technologies and open issues in the IoT space.	(Atzori, Iera & Morabito 2010)
A survey on Internet of Things	The basic technologies involved in the implementation of IoT and its main application area are discussed.	(Agrawal & Vieira, 2013)
Internet of Things (IoT): A vision, architectural elements, and future directions	To the technological research community, WSN presented its vision of IoT, increasing the need for distributed computing and the Internet to converge.	(Gubbi et al. 2013)
Towards internet of things: Survey and future vision	Highlighted architectures, new age applications and challenges facing IoT are identified.	(Said & Masud, 2013)
Context aware computing for the internet of things: A survey	Discussed the significant increase in sensor deployments over the past decade in the IoT space.	(Perera et al. 2014)
Internet of Things (IoT): A Literature Review	The key requirements, features, and aliases of IoT are highlighted. The study also highlighted the uses of IoT in our daily lives.	(Madakam, Ramaswamy, & Tripathi, 2015)
Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications	Protocols, enabling technologies and numerous application problems in the IoT field are discussed. The study also depicts the architecture of IoT with various elements and communication techniques. Finally, the study also highlighted the challenges faced in the field of IoT.	(Al-Fuqaha et al. 2015)
The Internet of Things—A survey of topics and trends	Emphasis is placed on the identification techniques, sensing technologies, networking and processing capabilities of the IoT.	(Whitmore, Agarwal & Da Xu 2015)
Internet of Things in arable farming: Implementation, applications, challenges and potentia	This article considers an analytical review of the current and potential application of the Internet of Things in arable farming. It provides an outline of current and potential applications and discusses challenges and possible solutions and applications. Finally, it presents some future directions for IoT in arable farming.	(Villa-Henriksen et al. 2020)

Table 2. IoT projects and areas

Sira	IoT Alan	Oran
1	Smart City	%23
2	Connected Industry	%17
3	Connected Building	%12
4	Connected Car	%11
5	Smart Energy	%10
6	Other	%8
7	Connected Health	%6
8	Intelligent Supply Chain	%5
9	Smart Agriculture	%4
10	Smart Retail	%4

Source: (Scully, 2018)

In a study, 1600 real IoT projects were evaluated and the 10 areas where IoT is used most intensively were identified (Scully 2018). The areas obtained as a result of the work and its position between the general projects are shown in Table 2.

As seen in Table 2, smart cities have taken the largest share in IoT applications.

Here are some examples of the applications of the Internet of Things in institutions:

Smart Thermostats: Homes Are Always at Normal Temperature

Smart home technologies are the adaptation of control systems used in many areas of industry to everyday life; Home automation is the application of these technologies to individual needs and wishes. The definition of smart home is used for homes that can respond to the needs of residents thanks to all these technologies, make their lives easier and offer a safer, more comfortable and more economical life. Smart homes include devices whose automated functions and systems can be controlled remotely by the user (Stefanov, Bien, &Bang, 2004).

Some people may need more than one technology. For example, a person with both movement and vision problems needs both visual interfaces and motion support (Stefanov, Bien, & Bang, 2004).

When it comes to smart home applications, it is one of the most popular products of our time: smart thermostats. Intelligent thermostats, which learn the routine in the living area with internet connection, adjust the house temperature according to expectations. Moreover, it offers the possibility to change temperature settings through mobile applications in cases where it is not at home.

How to Contribute to Energy Efficiency: Intelligent Waste Systems and Next-Generation Sockets

The theme of sustainability with the global population growth rate is also becoming increasingly important. The Internet of Things produces technological solutions in order to fulfill its responsibilities to nature. In addition, garbage cans that work with Internet of Things technology are automatically classified according to the category of waste and collect data on the evaluation of waste in recycling. Recycling-oriented, intelligent waste management systems directly contribute to ecology.

In addition to waste management systems, the next generation of sockets, which can be managed with a single button via smartphones, are compatible with numerous devices today. The outlets, which offer the possibility of turning power on and off at certain time intervals, monitor how much energy the connected device consumes and thus provide ideal conditions for energy efficiency. With a new generation of sockets where the time zones during which the desired device will remain on, just like an alarm, can be adjusted, without the need for subscriptions and distributors; many devices such as lamps, heaters and fans can be controlled wirelessly.

Digitalized Safety Concept: Sensor Security Systems

When sensors detect movement from any point in the house, they can warn by indicating the location of the unwanted stranger and determine the window and door that are open. Thus, the host has information about the place where there is mobility from the room or section where he is located (Coronet, 2004).

After steel doors, motion detectors, camera intercoms, today's technology continues to provide new alternatives to smart home applications. Global security system brands are now; it enables the management of systems via phones by developing safety/comfort systems that can manage sensors such as video, audio, motion, night vision, alarm, air quality and temperature with a single device. With speaker-enabled security systems, it also makes it possible to talk to households at home when away from home.

Technologies Used on the Internet of Things System

The concept of the Internet of Things was first proposed in 1999 by the employees of the MIT Auto-ID Center and studies were carried out in laboratories with RFID technology. This concept was officially announced with the report published by the ITU in 2005. As a result of the studies carried out, the number of devices connected to the internet and the number of devices per person are increasing exponentially every five years. According to the estimates made for 2020, the number of devices connected

Table 3. IoT Communication Technology Specifications

Technology	Standard	Year of Discovery	Up/Down Connection	Range (m)	Operating Frequency (MHz)
RFID	Wireless	1973	100 Kbps	2	0.125–5876
IEEE 802.15.4 6lo	WPAN	2003	250 Kbps	30	826 & 915
Z-Wave	Wireless	2013	100 kbit/s	30	868.42 & 908.42
LTE	3GPP, LTE and 4G	1991	100 Mbps	35	400–1900
LoRa	Wireless	2012	0.3 37.5 (kb/s)	3000-5000	169, 433 & 868 (Europe) & 915 (North America)
NFC	ISO18092	2004	106, 212 - 424 Kbits	<0.2	13.56
UBW	IEEE 802.15.3	2002	11–55 Mbps	10-30	2400
M2M	Open to all communication protocols	1973	50–150 Mbps	5-20	1–20
6loWPAN	Wireless	2006	250 Kbps	30	915

Source: (Al-Sarawi et al. 2017; Lea 2018)

to the internet based on the world population is estimated to be approximately 50 billion (ITU, 2005; Erdem, 2005; Evans, 2011).

Many different technologies such as RFID, IPv6, 6LowPAN, NFC, 3G, Wi-Fi, Bluetooth, GSM, ZigBee and WSN are used on the Internet of Things system. Due to the lack of coordination between these protocols, sometimes there are problems with working together and efficiently (Bozdogan, 2015). Some of the most used basic technologies in IoT can be briefly mentioned below.

RFID

RFID (Radio Frequency Recognition) system; It consists of reader and RFID tags. RFID tags are characterized by a specific address and applied to objects. RFID uses radio frequency electromagnetic fields to transmit data. These tags are embedded with electronically stored information that can be read by the RFID reader when the object is close to the reader (Duan and Cao 2020). RFID allows real-time monitoring of objects without the need to be in the field of view, which is why it is one of the most widely used and preferred communication methods in IoT.

RFID (Radio Frequency Recognition) is a radio frequency wireless communication system consisting of a label and reader that transmits information to the reader with electromagnetic waves emitted from the label (Bozdogan, 2015). RFID is considered the main component and enabler of the IoT system (Torğul, 2015). However, it has some differences with IoT, which is more advanced and incorporates different technologies. RFID technology is used to recognize and monitor all kinds of living and inanimate objects from a certain distance without touching them. RFID is becoming increasingly widespread today and is actively used in many sectors such as automotive, logistics, retailing, agriculture, health, textile, finance, energy, public, manufacturing, security. RFID technologies greatly reduce operational costs, accelerate workflows, increase efficiency and profitability *(*http://www.rfidturkiye.com/*).*

IPv6

Internet protocol (IP) refers to the common rules that devices on the network follow in order to communicate with each other. IP is an address that represents the device, so devices must have an IP address in order to exchange data online. Since many objects will connect to the Internet in IoT, IPv4 with 32-bit address space was predicted to be inadequate and the transition to the IPv6 system with a 128-bit addressing area was required (Bozdogan, 2015). IPv6 has 2128 IP addresses. In other words, with IPv6, introduced by experts as a solution in 1996, trillion different devices will be able to connect to the Internet 340 trillion times trillion times. IPv6, which provides a more reliable service with Ipsec feature, also saves processor with group addresses expressed as "multicast" "(https://ipv6.metu.edu.tr/tr/node/1)".

WSN

WSN (Wireless sensor networks) refers to wireless networks that use sensors and include independent tools to monitor physical or environmental conditions such as temperature, humidity, light, sound, pressure, pollution, noise level, vibration, object movements, etc. in different locations. Although WSNs have limited power supply, they have advantages such as reliability, accuracy, flexibility, cost efficiency and ease of installation. WSN has many application areas, especially military defense systems, biomedical and remote control. For example, WSNs can be effective in disaster areas where they are placed in disaster situations. Accurate and timely locating with distributed WSNs is vital in rescue operations. *"(*https://e-bergi.com/y/Kablosuz-Sensor-Aglari*;* https://ab.org.tr/ab09/kitap/kalayci_AB09.pdf *Erişim)"*.

ZigBee

ZigBee is named after the intricate zig-zag movements of bees between flowers. This zig-zag structure symbolizes inter-node communication in its complex network. Network components represent queen bees, male bees and worker bees. Since 1998, Zigbee-style networks have been studied due to the unfavorable use of wireless communication technologies such as Wi-Fi and Bluetooth in some applications. The goal is to create products that are highly reliable, low cost, energy efficient, and conducive to building networks for viewing and managing purposes (Börekçi, 2013).

Studies in the Field of E-Health

IoT provides a variety of solutions such as taking precautions, viewing and diagnosing people's health conditions. For example, tele-health devices that are used a lot in the field of health increase the quality of life of the patient in care as well as ensure the continuity of follow-up and care between doctor and patient (Torğul, 2015; Ulaş, 2015).

Studies on Smart Environments

In a study, a new method was developed with the analysis of Big Data, which is formed by combining traditional environmental monitoring and management systems with Internet of Things technology. The results of the study show a visible increase in air temperature in Xinjiang over the past 50 years (Fang, et al., 2014).

Transportation and Logistics Studies

With the help of sensors, data such as number of vehicles on the road, road density, traffic works on the road, where parking spaces are located and occupancy rate, etc. can be obtained and used to develop methods to ease transportation. For example, with the help of a small sensor called "HikoB", variables such as air temperature, humidity, traffic volume can be calculated and potential hazards on the road can be determined and drivers are warned (Torğul, 2015).

Studies in Modern Agriculture

IoT technology was also introduced in the field of agriculture. Automated garden irrigation systems have been used for a long time, but thanks to IoT technologies, this technology has started to be used much more efficiently. Now, the humidity of

the soil is measured by sensors placed underground. In this way, irrigation systems work automatically in case of need. For example, irrigation systems do not work when it rains; on sunny days, the system works more often.

The complete unification of the logic world with the real world is now imminent. By 2020, it is estimated that about 50 billion devices will be connected. It is estimated that $6 trillion will be invested in companies offering IoT solutions over 5 years. Considering the investments made in this area, it is not wrong to say that the return on the investment made will not take long. SAP continues to be very guiding on IoT. Sap, one of the first promoters of IoT in Europe, enables companies to quickly develop and manage their own IoT and M2M applications with the Hana Cloud Platform (HCP). SAP's internet services help remotely monitor and manage connected devices, where data can be transmitted safely to the SAP HANA Cloud Platform. SAP HANA's built-in engines make it possible to make predictions and visualize data with ready-made packages.

Studies on Smart Cities

Thanks to the building sensors to be used in buildings, the integrity of the buildings is measured periodically and when consolidation work should be carried out is monitored via an online platform. In addition, hour-street density can be monitored instantly with sensors and street lighting systems can be managed with minimal energy. Location-based noise measurements can be made in cities thanks to the sound sensors used.

M2M (inter-machine communication) technologies are used by many companies today. One of the most important areas is undoubtedly vehicle tracking systems.

Figure 1. Studies on Smart Cities
Source: https://blog.detaysoft.com/category/iot-ve-endustri-4-0/ (2016)

Thanks to its vehicle tracking systems, many companies can control and manage the vehicle from a single platform. From a small cargo company to a large logistics company, many businesses use this technology. The use of plastic water bottles can also be monitored by IoT technologies. According to the regulation of the ministry of health, a water bottle can be used for a maximum of 5 years and can be used up to 75 times. With the help of a small chip to be used in water bottles and sensors to be used in the plant, the number and life of each water bottle can be easily monitored.

Abroad, some grocery stores check their stocks with the help of sensors and automatically send messages to their suppliers in case of reduced product stock.

Intelligent Measurement Systems Studies

In a study of smart grids, it is stated that the integration of the Internet of Things and the final measurement method will ensure the flow of two-way data between customers and electricity distributors. Another study made an Internet of Things-based Power Saving Meter that can save energy by measuring and monitoring the total amount of power consumed by household appliances (Sinha & Alexv, 2015).

Cafe

IoT that enters our lives is not limited to connecting major devices. Because every innovation made on the internet and technology side can enter into the concept of the Internet of Things. The first study for IoT was conducted in 1991 by Cambridge University academics on a need. A camera setup was set up (it could take 3 images per minute) so that academics who went to buy coffee from the coffee machine did not encounter the hollow machine. Thus, the waste of time was prevented, and academics were prevented from spending time and effort by taking dozens of steps unnecessarily. This study has managed to go down in history as a very seminal application according to the conditions of the period (Islak, 2016).

Energy and Mining

IoT can be used in the communication of solar panels and wind stands with each other, or in oil refineries and monitoring pipelines, again in mining (such as miner safety and emergency applications) (Erdem, 2015). In addition, smart energy meters and meters such as electricity, gas and water can be read and managed remotely, and healthier and faster pricing, supply and demand planning, etc. can be done with the information collected (Ulaş, 2015).

Industrial Internet of Things Studies

It requires that accounting control take on a new role with the recently prominent concept of Industry 4.0, which focuses on developed countries, developing countries, countries that want to develop and change. With the impact of today's developing technology and globalization, enterprises have come under the influence of Industry 4.0. The concept of Industry 4.0, in which businesses are directly affected, also directly affects the science of accounting. For businesses, this integration process also affects accounting and therefore accounting auditing. Within the framework of these developments, it is very important to examine the relationship between Industry 4.0 and accounting auditing to lead to new research.

To explain what the fourth industrial revolution, referred to as Industry 4.0, means, it is important to review the earlier stages in the industry. It is generally accepted that the world's industry has evolved with four revolutions (Oktay-Fırat, 2016).

According to the definition of Chui et al. (2010); While the communication of objects is defined as the connection of physical objects to the Internet; According to Atzori et al. (2010); objects define as the intersection of internet and semantic dimensions.

Siemens' digital factory in Amberg, Germany is considered one of the closest to the aforementioned technology. In 1989, the factory of the board was able to increase the production capacity by 8 times without changes in the production area. While smart machines carry out $^{3/4}$ of the work done in the factory; $^{1/4}$ of it is labor intensive. Factory completion success is 99.99%, which is an indication that there are no concepts such as production errors and waste (Erturan & Ergin, 2017).

Ups shipping company can monitor 60,000 vehicles in the U.S. instantly thanks to its internet data network system. This is an indication of the effectiveness of the NEU internal audit (Muller, 2012).

Today, serious reflections of the digitalization trend that occurs in daily life are observed in business life.

Internet of Things and Digital Transformation in Business

Referring to concrete market examples related to IoT, Schwab (2018) states that the Golf car produced by Volkswagen, one of Germany's leading automotive manufacturers, has installed 54 microprocessors to collect data from 700 data points and is designed with a data processing capacity of 6 GB with these processors. Another example is that with the help of sensitives placed in machine hoses operating at high pressure, Eaton Corporation uses IoT technology to predetermine the corrosion times of these hoses and prevent job losses and workplace accidents.

WHAT'S NEW IN THE INTERNET OF THINGS MARKETING?

Personalized Real-Time Marketing

By 2020, according to some research, 50 billion objects are projected to be connected to each other over the internet and 75 billion objects are projected to be connected to each other (Evans, 2011; Dubash, 2016). This means that almost ten internet-connected objects per capita fall. So many devices around the consumer will facilitate the flow of personal data to businesses within the person's consent. Businesses will be able to process this data and make presentations to the consumer with personalized offers. In addition, these offers will be available as soon as data comes in from the consumer, that is, instantly and in real time.

For example, Diageo Johnnie Walker brand makes personalized presentations over liquor bottles with digital labels called "Blue label". For example, if the bottle appears on grocery store shelves, special discounts or promotional offers are being uploaded, while personalized cocktail recipes can be offered if sensors show the bottle is at home and open (Brinker, 2015).

Near-Zero Marginal Marketing Costs The marginal cost of producing and incoming a new product with the Internet of Things is projected to be closer to zero by the day. Just as the cost of accessing information has become quite cheap and close to zero compared to the past, especially with information communication technologies (IT), both production and marketing activities of the products are at rock bottom with integrated internet systems.

For example, in 2002, the world's first low-cost 3D printer was launched for $30,000, and today it is possible to find high-quality 3D printers for $1,500. Again, during the 1st and 2nd industrial revolutions, when the capitalist system was heavily felt, the high advertising, promotion, etc. costs of central communication, where the main players were newspapers, magazines, radio and television, paved the way for large global companies and hindered small manufacturers. Today, a small business that manufactures with IoT with 3D printers etc. anywhere in the world can promote products at a marginal cost of close to zero using any marketing site that is increasing in number day by day (Rifkin, 2015).

Integrated marketing: Advertising is the process of coordinated co-operation of retention activities such as public relations and all other activities and relations with customers, employees, shareholders, etc. At this point, it is important to integrate enterprises with each other and with the online world. IoT, for example, will allow BMW, which has partnered with Visa, to order and pay for pizza hut in-car audio (Brinker, 2015).

With the ongoing revolution of the Internet of Things and the increasing influence of robots in many activities of life, robotic applications powered by the Internet

of Things are a concrete fact of our upcoming future. Accordingly, new advanced services based on interaction between robots and objects are designed to help people.

Strictly Safe and Healthy Factory (FASyS) develops a new factory model that is compatible with the concept of Future European Factories (EFoF), aims to minimize occupational health and safety risks and ensures the well-being and comfort of workers in manufacturing, processing and assembly factories. For this purpose, it can represent the mobile application that detects valuable tools and continuous working conditions, occupational health and safety conditions, especially for the distribution of information and communication technologies and wireless communication technologies.

In a study, a platform applied for this purpose is offered within the scope of FASyS project. In addition to monitoring the status of wireless networks, its implemented platform allows for the reconfiguration of remote communication settings for wireless nodes based on possible failure or Networking Quality of Service (QoS) fragmentation notifications. These functions are thought to help secure reliable wireless communication in the industrial environment to create innovative workforce risk prevention applications in information and communication technologies (Ferrer-Gisberta et al., 2013).

In addition to the above studies, in June 2016, a comprehensive survey was conducted by TUBITAK to approximately 1000 private sector organizations that have received R&D support from TUBITAK in the relevant technological fields in order to determine the current situation and needs for smart production systems. In addition to the sections consisting of questions to measure the levels of interest and integration of organizations related to R&D and smart manufacturing; R&D and international cooperation needs, national competence based on related technologies, company level and national level impact potential assessments were also included. The summary findings of the analysis for this survey are as follows (TUBITAK, 2016).

When looking at the awareness levels of the companies participating in the research; While 22% have comprehensive information, 19% have no knowledge of the subject. 59% of the participating companies have a general knowledge of the subject, - in other words, the three sectors with the highest level of awareness with comprehensive knowledge of the subject; Computer-Electronics-Optical products with 39%, Software with 36% and Materials (rubber-plastic) sector with 22%, - The 3 sectors with the highest "Maturity Level" in terms of integrating related technologies into production lines; Material (rubber-plastic), Computer Electronic-Optical products, Automotive and White Goods Sub-Industry, - 3 technologies evaluated as "Providing The Most Added Value" according to the research; Automation and control systems, Advanced robotic systems and Additive manufacturing are the 3 sectors where added value is assessed to be the highest; Machinery and equipment, Computer-Electronic Optical products and Automotive-White Goods sub-industry.

Table 4. 3 Technology groups and 8 critical technologies within the scope of the roadmap

Digıtalization	Big data and cloud computing
	Virtualization
	Cybersecurity
Interaction	Internet of Things
	Sensor technologies
Factories of the Future	Additive manufacturing
	Advanced robotic systems
	Automation and control systems

TUBITAK's study indicates that the level of digital maturity of our industry is between Industry 2.0 and Industry 3.0 (Yıldız, 2018).

Safety Provision and Emergency Studies

WSN (Wireless sensor networks) refers to wireless networks that use sensors and include independent tools to monitor physical or environmental conditions such as temperature, humidity, light, sound, pressure, pollution, noise level, vibration, object movements, etc. in different locations. Although WSNs have limited power supply, they have advantages such as reliability, accuracy, flexibility, cost efficiency and ease of installation. WSN has many application areas, especially military defense systems, biomedical and remote control. For example, WSNs can be effective in disaster areas where they are placed in disaster situations.

Studies in the Field of Shopping

To enable the commercial dimension of Internet of Things applications, new types of business models need to be developed.

NFC (Near Field Communication) can also be defined as wireless technologies that enable radio frequency communication over short distances. Unlike RFID, which communicates over long distances, NFC has a coverage area of 10 cm. Unlike Bluetooth, NFC does not have a matching code. Also, NFC tags do not need batteries, as the power consumption is very small. Especially due to their integration into smartphones, mobile payment, banking, e-ticket, electronic transit systems are used in many areas. for example passive NFC tags on posters may contain information such as web addresses discount coupons or bus departure times "(Bozdoğan, 2015, https://www.haberler.com/nfc-nedir-ne-ise-yarar-6903881-haberi/)".

Logistics and Vehicle Tracking Systems Studies

Today, land vehicles contain many advanced sensors that allow a large amount of parameter collection. In one study, Vitruvius provides a platform for users with no programming knowledge to quickly design and implement rich web applications in real time with data from sensors they can put into practice (Fernandez, et al., 2014).

The authors of a study evaluated data from Travis Country, Texas, primarily to identify those who used bikes for fitness purposes. Bicycle sightseeing volumes are assessed to characterize residential and environmental density, land use diversity, cycling facilities and places selected for health. Although limited to logged bike rides and routes using the voluntary smartphone app, this method provides hope for applications in versatile transport planning and health assessment studies (Griffin & Jiao, 2019).

SOLUTIONS AND RECOMMENDATIONS

IoT will enable a more precise interpretation of consumer purchasing behaviors The customer will be involved in production as a player with IoT, especially with social media, they will be able to actively participate in the production processes of companies. A more integrated marketing process will emerge. A more sustainable manufacturing and marketing process will begin for both businesses and consumers, as the concept of green electricity will form the basis of IoT. In line with the research carried out, just as this assumption is made, it will be important in all sectors in organizations.

FUTURE RESEARCH DIRECTIONS

As seen in the scope of the research, the concept of IoT is promising. Considering the ever-increasing demands for IoT, the studies to be done in the future and the questions to be answered are "1.How will the next generation information systems work in sync with IoT? 2- Which IoT business model will manage and drive the global business and trade of the next generation? 3- Will objects rely only on Internet infrastructure for communication in the near future? 4- What period will start after IoT?"

The Internet of Things is considered perhaps the greatest revolution of modern times. Because it offers technology that can radically change life. Dozens of phenomena such as highly intelligent robots, interconnected intelligent objects,

drones, etc., previously presented only to humans in sci-fi films and novels, are about to take place today. IOT technology using sensors, biochips and RFID, NFC, bluetooth, wi-fi etc. of different sizes and shapes has been introduced in all sectors. Health, industry, agriculture, food, home automation is just a few of them. It may be recommended for future studies to include studies carried out on a country-by-country basis.

CONCLUSION

These new technologies continue to be informative and guiding for us in all areas of our lives. Together with IoT technologies, the data collected by the systems are analyzed and made sense online and ensure that action is taken in a way that benefits the society.

In this study, a screening study covering the internet of things application areas around the world was carried out and applications in "E-Health", "Home Automation", "Smart Environment, "Smart Water, "Smart Agriculture, "Smart Livestock, "Smart Energy, "Smart Cities, "Smart Measurement, "Industrial Control, "Security and Emergencies, "Shopping, "Logistics" were emphasized.

Applications: The internet of things, which aims to connect objects, devices, people, cities and the whole world, will continue to facilitate life with the advantages it will provide to businesses and consumers and unimaginable technologies. With IoT, an integral part of the fourth industrial revolution, people's lives; habits, needs and expectations will change.

Developments that the World Economic Forum predicts will take place by 2027 (www.weforum.org); the much greater involvement of robots in human life is the spread of wearable technologies, manufacturing and healthcare with 3D printers, production of consumer goods with 3D printer, driverless cars, connected smart homes, smart cities and the sharing economy. Given all this, it is imperative that businesses and marketing management prepare themselves, their strategies and policies for these upcoming developments.

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Chapter 3
Working Women's Digital Inclusion (Exclusion) During the COVID-19 Pandemic and Beyond: A Literature Review

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ABSTRACT

The COVID-19 crisis provides a novel perspective for studying a pre-existing issue of the gender digital divide. This chapter examines the literature on women's digital economic participation during the pandemic. A systematic literature review (SLR) of 20 peer-reviewed papers from various social sciences, encompassing the COVID-19 period of 2019 to early 2022, was conducted. The discussions surrounding the impact on women's migration to work from home are extended across the three key levels from which digital inequalities emerge: (1) digital accessibility, (2) digital literacy, and (3) family role. The prevailing narrative in the reviewed publications revolves around women's unpaid care labor during the pandemic, the primary cause of the remunerated time decrease and productivity. Overall, the findings suggest that digital inequality is embedded in societal structural inequalities; thus, it is crucial not to let the overemphasis on digital accelerations leave behind the deep-seated challenges of women's digital inclusion amidst diverse roles.

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INTRODUCTION

Even before the pandemic, businesses were looking at technology as a helpful means of engaging with customers, allowing some workplace flexibility and a way to introduce automation and faster processes. The spread of the novel coronavirus and the shutdown of in-person meetings for non-essential businesses accelerated these adaptations. Technology has become an increasingly important part of the workforce. When Covid-19 hit, it compelled social changes all around the world. Governments banned large gatherings of people, restricted in-person business operations, and encouraged people to work from home. In response, businesses and schools began to look for ways to continue their operations remotely, thanks to the Internet.

Many firms' migration to digital operations required both a customer-facing and a behind-the-scenes function. Because of the inability to congregate in groups, many professional organizations have to devise new methods for individuals to interact, cooperate, and accomplish jobs while working far from one another. At the same time, clients have shown a desire to obtain services with little to no human touch, pushing for remote or at least contact-limited operations from a customer-facing perspective. How organizations might embrace digital transformation and which portions of these changes are likely to last depends on exploring what is available and what needs to be done.

The COVID-19 outbreak has underlined that the digital revolution that is in progress does not provide the same opportunities for every individual equally and, therefore, creates social inequalities (Bartikowski et al., 2018). The gender gap is no exception, and research shows that lockdowns are strongly impacting women, who, on the whole, are more vulnerable to the effects of a crisis (Rodríguez-Rivero et al., 2020). There are dangers to moving too quickly, and we must continue to investigate and address current barriers as well as new challenges that women encounter in order for them to participate in the digital future. At the same time, the pandemic has shown that the danger of failing to act quickly enough is higher than ever: inclusion cannot wait. This is the purpose of this book chapter, to gather what Covid-19 exposes about working women's digital participation.

The early 1990s' definition of the digital divide concept, which generally refers to a binary division between people who have and do not have access to computers and the Internet (Dewan and Riggins, 2005), has emerged to the levels and new forms of digital inequality, such as type of internet access, algorithmic awareness, and data inequalities (Lythreatis et al., 2022). In the 21st century, women want equal opportunities as men, and the foremost challenge is how to balance work and home. Gender bias, unequal pay, mental and physical harassment, and insufficient leave are some key issues for working women. A woman's hardship at any stage of her life is always difficult to categorize because she is the only entity in the world going

through such a life-changing experience as being born as a girl child, becoming a wife, and finally becoming a mother (Verma and Mulani, 2018). The lives of working women extend well beyond what they are expected to accomplish as paid work, although it may be convenient to limit our attention to the workplace. The pre-pandemic survey on the problems and concerns confronting working women in the twenty-first century demonstrates that the obstacles women experience vary significantly from place to place. In other words, working women, especially those with household responsibilities, are called to strike a balance between being physically present at home and work.

The authors conduct this study recognizing that the global COVID-19 pandemic has far-reaching ramifications for employees and labor markets (Dunn et al. 2021). The unprecedented event created by the pandemic is revolutionizing the path of conducting business and offers the possibility for employed women to work from home. Some researchers argue that the effects of crises are seldom gender-neutral, and the COVID-19 pandemic is no exception. This book chapter is intended to provide the reader with an integrative panoramic perspective of the present yet future-oriented research on the digital divide, including context, problems, initiative, innovations, and best practices for bridging such schisms. The analysis seeks to investigate the challenges, empower women's involvement, and inform civil authorities and policymakers about potential future inclusive policy proposals.

BACKGROUND

To build the groundwork for the investigation, some fundamental criteria are established for online job migration. These characteristics provide the context of the workers' status, both men and women, during the pandemic. It depicts the condition of both those who are already employed and must adjust to the new normal of working from home, as well as the potential for new online jobs to meet the current sanitary crisis demand. These parameters that trim down the context of working women's digital inclusion are based mainly on the data provided by the surveys. The findings of these surveys are taken from PEW Research Center (Parker et al., 2020), World Bank COVID-19 surveys (2021), and AXA Report on Women and Digital (2021).

How Many Jobs Can Be Done From Home During the Pandemic?

Reviewing the economic effect of COVID-19 social distancing measures, poses a basic issue about the current economy: how many occupations can be done from home? Kohhar and Passel (2020) for Pew Research Cneter reports that not all

employed individuals, especially during this pandemic, have the option of working from home. Workers who can and cannot telework are clearly divided into two classes. A whopping 62% of workers with a bachelor's degree or above think they can work from home. Those without a four-year college diploma account for only 23% of the population. Similarly, while the majority of upper-income individuals can work from home, the majority of lower- and middle-income workers are unable to do so.

Dingel and Neiman (2020) report that only 37% of employment in the United States can be done totally from home, with substantial variance among locations and sectors. Most North American employees who think their job responsibilities can be done mostly from the home claim they seldom or never teleworked prior to the pandemic. Only one in every five people claim they work from home all or most of the time. Now, 71% of those employees work from home all or most of the time.

Does the Possibility to Work From Home Give Major Flexibility to the Workers?

The global pandemic has left a huge section of the workforce unable to go to work in order to slow the virus's spread. Consequently, both companies and workers are looking for alternate work arrangements, particularly in a fast-paced city like Hong Kong. Because of the pandemic, most, if not all, employees had to work from home (WFH). As a result, most governments have made WFH a policy priority. In doing so, policies must be developed with the practicality of both employers and workers in mind. However, the present scenario offers unique insight into how effectively working from home works, and it may play a critical part in future regulations that reconfigure the existing structure of working hours, perhaps allowing for greater flexibility (Vyas and Butakhieo, 2021).

According to Parker et al. (2021) for Pew Research Center, many people would prefer to telework after the pandemic is over; for many, the shift to working from home has been rather straightforward. More than half of those polled said, without giving distinction between men and women, they would choose to continue working from home even after the pandemic if given the option. Laborers, who are in the same employment they had before the outbreak, work from home all or most of the time today but seldom or never did before the pandemic have seen some evident benefits from the change to telework. Almost half (49%) think they now have greater freedom in terms of when they work. This is much higher than the percentage of teleworkers who worked from home all or most of the time before the pandemic, of whom just 14% feel they have greater freedom today. Furthermore, 38% of new teleworkers think it is now simpler to reconcile work and family duties (vs. 10% of teleworkers who worked from home before the coronavirus outbreak).

Based on the results of these surveys, it is time to look at the impact of this work-from-home transformation on working women in particular. The following sections aim at determining what factors influence women's digital participation during the pandemic. What impact might there be on working women if there is a significant migration to work from home? What is flexible in flexible working for women?

Working Women Category

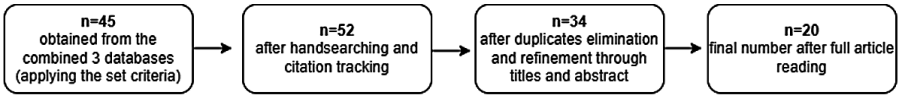
The study aims to illustrate how moving to telework during the Covid-19 lockdown in an organizational setting affects working women's participation in digital technology. This study specifically focuses on the teleworking experiences of middle-class professional women. We collected all available information covered by the previous studies regardless of the type of job, independent of their marital status and spanning geographical boundaries in order to expand the literature review analysis that only covers a specific time period.

METHODS

The authors employ the three-stage systematic review methodology developed by Tranfield et al. (2003) and later integrated by Lythreatis et al. (2022). These three stages include: (1) planning the review, (2) collecting data, and (3) analyzing the literature and synthesizing the research findings with some adjustments necessitated for the present study. This review consults peer-reviewed journal publications that were published between 2019 and 2022 in the Covid-19 period (see figure 1). In systematic reviews, it is typical to just include a few years of the literature in order to achieve the review's objectives (Lythreatis et al., 2022). This method lets researchers compile material on the digital gap from a pandemic standpoint. Sample demographics that were not pertinent to the chapter's goal were purposefully omitted (i.e., number of publications each year, the research method of each article, data classification, etc.). The list of samples with a total of 20 articles is presented in Appendix A including all the contributing authors, year of publication, journal, and context from where the data have been gathered. According to Jesson et al. (2011), as the purpose of a review is to present a reliable synthesis of the literature on a particular issue, the number of references to include is highly dependent on the topic and the amount of literature that exists on that specific subject.

Second, Scopus and Web of Science (WoS) databases were utilized to find relevant publications, which were enriched using Google Scholars. To guarantee that the articles collected were relevant, the authors searched for prospective publications that suit the research using a combination of the following keywords in the title

Figure 1. Search and Elimination Process



or abstract: "digital inclusion" OR "digital divide" OR "digital exclusion"; AND "working women" OR "working women online" "work from home women"; AND "Covid-19" OR "Covid-19 Crisis" OR "Covid-19 Pandemic".

Third, categorizing current research into predefined categories is considered a valuable technique for organizing the literature and bringing dispersed data together (Tranfield et al., 2003). Wei et al. (2011) identified the most prevalent categories of analysis, which they called "levels of the digital divide." These digital divide levels were developed in a number of past investigations and then reformulated by the present researchers to fit the goals. These research areas are primarily concentrated around digital accessibility and digital literacy, and instead of digital output, women's family roles are incorporated since the current examination is focused on online jobs.

Review Results

Through the help of the surveys in framing the background and scope, it shows that: (1) *indeed, there is a surge in bringing work at home during the pandemic; and* (2) *the possibility to work from home gives flexibility to the workers.* The following sections will look closer at the specific effects of the rise in online jobs as well as the flexibility aspect for women working from home. As previously stated, the classification of the most significant characteristics that are unique to the digital divide domain was adopted from Wei et al. (2011) and reformulated based on current concerns.

First Level Digital Divide: Working Women and Digital Accessibility

Women had less access to the Internet than males even before the pandemic and were less likely to use digital tools and technology. The gender digital divide is a term used to describe this situation. Furthermore, gender digital inequalities are expanding due to limited access to technology, inherent biases in the digital growth, and an alarming increase in gender-based harassment and violence online.

The pandemic further exposes that digital access inequality is gendered, especially in less affluent economies. Women are less likely to have access to mobile phones or

the Internet than men (ITU, 2019). Women possess ten percent fewer mobile phones than males in low- and middle-income nations, and 300 million fewer women utilize mobile Internet globally (GSMA, 2020). This digital divide has harmed women's capacity to adapt to hardship in the face of the pandemic, both at work and at home (Zheng and Walsjam, 2021). This forces them to remain silent as they do not have an equal opportunity to voice their concerns and desires. Nevertheless, the way technology reaches out to women is not specific to a geographical divide but rather a result of both social and economic development and gender traditional roles that persist in both affluent and less affluent countries (Sarrasanti et al., 2020).

Studies like that of Velicu et al. (2022), explore characteristics that predict digital inequalities and demonstrate the impact of sociodemographic variables usually associated with socioeconomic inequalities, such as age, gender, educational attainment, and income. Even in developed countries with universal internet access, economic class remains a clear dividing factor (for access, skills, and use), with those with higher economic capital using the Internet primarily for capital-enhancing activities while those with lower economic capital use it primarily for entertainment. Furthermore, the type of device used to access the Internet affects (mobile-only users vs users of a larger, but more expensive, device repertory), is impacted by digital abilities, and has an impact on additional user advantages.

On the other hand, women who have access to the internet face additional obstacles, including an increase in online GBV (gender-based violence) and restrictions on or prohibitions on women's access to the Internet. Cyberviolence against women has become a new route for GBV as technology has advanced. Women are unable to work from home or access critical services such as survivor support groups, counseling, health information (including sexual and reproductive health), and other online resources due to a lack of connectivity, which can be lifelines for women experiencing GBV (gender-based violence) during the lockdown (Dlamini, 2021).

When comparing male- and female-owned firms in terms of internet technology use, Liu et al. (2021) found no differences. The government's response to COVID-19, however, should not dismiss the uneven hurdles faced by women-led businesses. Countries with a high gender inequality index or a low GDP per capita should implement strategies to narrow the gender gap during the pandemic and defend women and their firms.

Due to the COVID-19 pandemic, the global digital revolution is speeding up, with people increasingly working, buying, and selling goods, and socializing online. This brings up new opportunities and challenges, putting women at risk of further marginalization. This first level of the digital divide shows that, rather than being entirely due to unequal technology distribution among men and women, the gender digital divide is shaped by socio-cultural factors.

Second Level Digital Divide: Working Women and Digital Capability/ Literacy

Even the pre-pandemic scenario recognizes the action needed across diverse areas to ensure all women and girls can fully participate in the online world with a Broadband Commission Working Group on Digital Gender Divide proposing several recommendations, including around digital literacy and confidence and the availability of relevant content, applications, and services (Broadband Commission, 2017).

Sarrasanti et al. (2020) further highlight the need to have programs that consult and engage with women, as technical infrastructure tends to be indifferent to the disparities between men's and women's technological literacy. One reason is that computers, software, a high-speed broadband Internet connection at home, and other associated services such as messaging applications or video conferencing systems are among the essential and often expensive technology required for working from home that women lack or have limited access to. On average, women have less exposure and familiarity with digital technology than males, which puts them at a disadvantage while working remotely.

In contrast to Liu and colleagues' results, Alam et al. (2021) argue that there is a substantial difference in perceptions of digital transformation between female- and male-led firms. In regional Australia, gender, in particular, has dramatically impacted the influence of social networking on perceptions of the digital transition. The findings, however, do not account for the region's social, cultural, and economic backdrop impacts on women-led firms. This finding suggests that, even though women-owned/managed SMEs utilize social media more than their male counterparts, the skill levels of ICT workers in women-owned/managed SMEs are higher than in male-owned/managed SMEs. This might indicate that women require greater help with digital strategy than their male counterparts. According to research, men are more inclined to seek 'technical' jobs, while women are less willing to invest in IT skill development, as seen by their preference for 'softer' technology roles. Women appreciate the value of using social media to grow their companies in the context of this survey. One may argue that they do so because they prioritize relationship management in the development of their firms, yet they engage ICT personnel to a greater extent than male-owned enterprises since they may not have the necessary ICT capabilities to drive digital transformation.

It should be noted that women's experiences are divergent depending on their different socioeconomic status and the social and cultural norms to which they are subjected (Zheng and Walsham, 2021). Women in disadvantaged groups often carry the double burden of wage-earning and caring for family members. Yet, they are also more likely to have a lower digital capacity to find relevant information about the pandemic, support homeschooling for their children, or be effective in performing online jobs.

Third Level Digital Divide: Women Working From Home and Family Role

Women are shown to undertake far more unpaid domestic and care labor than males, leaving them with less time to advance in their careers. Families have been faced with more responsibilities and burdens but less resources than ever before. Furthermore, the lockdown has increased household care duties, as staying at home implies extra cleaning, cooking, and other tasks. To keep up with the speed of pre-COVID-19 academic programs, "School from Home" has significantly relied on the (unpaid care) effort of families (Rodriguez-Rivero et al., 2020).

Women who work from home are more likely to take on additional domestic obligations and assist their relatives, increasing their responsibilities and disrupting the work-life balance (Mendonça et al., 2022). The formal and informal childcare provision grew more challenging, and women bore a more significant share of the unpaid childcare load (Sarrasanti et al., 2020). Many were compelled to work from home while also becoming homeschoolers for their children and juggling other responsibilities. Furthermore, some women have been unemployed or have been forced to abandon their employment, forcing them to devote their full attention to the care labor duties (Van Barneveld et al., 2020).

Women do most of the "invisible work" in the household and are more vulnerable due to the pandemic. According to data from 104 countries, 67 percent of health professionals are women, making them particularly vulnerable to long hours and stress. During a pandemic, women in most societies bear greater responsibility than men in caring for the family and household, such as extra housework, homeschooling, and caring for the elderly and sick, which are often economically devalued and taken for granted, further undermining women's economic activities and earnings (Zheng and Walsham, 2021).

For individuals who are required to work from home, the unequal distribution of care labor provides a lighter load on males since women frequently bear the main responsibility for childcare, homeschooling, and household duties (Towns et al., 2020). Domestic servitude is forced upon women when they obediently accept male privileges in their households, assume major caregiving tasks for small children and elderly relatives, and become victims of abuse directed against them (Mathrani et al., 2021). Household obligations are already imbalanced between females in many nations and cultures; sadly, they become even more so during times of crisis. Furthermore, parents who are considered key employees or single parents are at risk as a result of school closures. Women are tasked with the ongoing organization of their homes and families that further intensify their subordinate position in the household.

Women, for example, are responsible for 75% of unpaid domestic and care work worldwide (Dunn et al., 2021). As a result, women frequently engage in extra work outside of the traditional labor economy, referred to by sociologists as a "second shift" (unpaid domestic chores) and a "third shift" (unpaid emotional labor outside the home). Scholars have demonstrated the fallacy of the concept that platform-mediated markets are gender-neutral in the context of online freelancing. Given that women have historically handled a bigger share of family obligations, examining the impact of gender in developing kinds of labor seems even more critical.

The gendered cultural standards of home obligations imply that women face the brunt of the pandemic downturn for women undertaking technology-mediated employment remotely. The consequence is that the recession is not only undoing decades of progress in gender equality but is also aggravating inequities in the distribution of family responsibility. Simply put, female employees, in general, are experiencing a "double disruption" in their working life, with two generations of development at stake (Dunn et al., 2021).

Unpaid care work, which women largely do, is a significant but underappreciated contributor to economies. Due to limited mobility, social isolation, and economic constraints, the need for unpaid care work grew during the COVID-19 pandemic. This outbreak has underlined the need to acknowledge and appreciate women's domestic labor, which has been systemically undervalued. Simultaneously, it has raised a demand for technology, revealing the gender digital divide (Sarrasanti et al., 2020).

Globally women tend to take on a disproportionate share of the caregiving for children unable to attend day-care, preschool, or school due to COVID-19 taking care of the elders amongst other unpaid essential work. This compromises the time left for women to participate in income-generating activities.

GENDERED FLEXIBILITY

Work from home should not be mistaken as an automatic equivalent of flexible working, especially when it is mandated, as it was during the lockdown. Flexible working is defined by Kelly et al. (2011) as an employee's control over when and where they work and, therefore, versatile.

In response to the question 'Do you think that the working from home scheme is making you more productive?' 45% of women do not agree, 45.6% agree, and 9.4% strongly agree. However, 60% of women agreed that working from home increases their workloads (Parker et al., 2020). Furthermore, those still employed but must work from home indicated that they must care for their spouse, who is also working from home, and assist their children with homeschooling and domestic chores. Because they both occur within the household domain, the first and second work shifts are

interwoven and frequently in conflict in this scenario. It is worth noting that the study's methodology has flaws, most notably in the sample size and data collection procedure, which excluded women without Internet access, the jobless, young girls, and those working in the informal sector. Nonetheless, the findings underline the problematic nature of women paid and unpaid employment.

According to extensive studies on how working from home affects employees in many countries, women are less satisfied than men when working from home since they are responsible for the majority of caring. Similar findings have been seen in countries such as Germany, where research found that having more flexible working hours and working from home increases workload. Much other research has found that working from home causes women to experience greater work-family conflict.

Time and space flexibility in the workplace, such as the "platform work" economy's space and time flexibility, can be a 'positive' alternative to traditional employment if policymakers consider it as a potential for a more inclusive labor market (Carchio, 2019). Studies are looking at how flexibility in digital labor platforms can provide greater work adaptability for female caregivers and increase women's effectiveness in the face of job quality risks in a way that reduces gender gaps in labor force participation by making working arrangements more flexible.

Although work-family balance affects men and women, it still primarily concerns women (Cesaroni et al., 2018). These results align with the studies of Chung and Van der Lippe (2020), showing that gender matters in understanding the outcomes of flexible working, but it also matters differently in different contexts.

Critical Reflections on Women's Digital Participation

One issue that makes women more vulnerable in a crisis is that they are viewed as an extra and flexible workforce. This places women outside the core workforce and forces them into lower-quality jobs. The findings illustrate how digital inequalities can put disadvantaged groups at greater risk of diminished social contact during a public health crisis, and women's role at home is pivotal. For example, freelancer women wanted internet jobs that matched their household schedules because they were motivated by flexibility. Due to growing competition for online work, women freelancers will be forced to bid for more jobs and accept lesser pay, even if this is not in their best interests.

The status of women and the various demands on men's and women's time has been a major concern of feminism. Over time, women have been disproportionately in charge of the family and childcare, which has not been equal. It is one of the elements that has made it difficult for women to attain influence in the public arena and has stopped them from obtaining advancements in their professions.

DISCUSSION

Digital inequality is rooted in structural social inequalities such as income, education, and opportunities. It is important not to let the overemphasis on digital accelerations disguise or divert from the more fundamental and deep-seated issues of women's segregation, division, and exclusion. This chapter only scratches the surface of some of these issues, much research has shown that digital technologies do not necessarily resolve social stratification but also often exacerbate them. When policymakers and civil society organizations consider digital technology as an innovation or solution, it is important to remember that "empowerment" in one space is often accompanied by "disempowerment" in another (Pandey & Zheng, 2019) and that precautions must be taken to avoid negative consequences such as exploitation, precarity, surveillance, alienation, discrimination, and algorithmic bias. In short, digital technology is expected to play an even more significant role in defining the post-pandemic world. It is vital to continually ask if digital technology makes the world a better place.

Research Agenda

In most of the cases above, inequality does not occur along a single axis. Instead, various fracture lines and variances might be seen within the same category. While most women share the responsibility of 'invisible labor' at home, females from poorer socioeconomic backgrounds are more likely to be susceptible during the lockdown and economic downturn. In the fast-paced world of globalization, digital inequality in terms of gender, class, and kind of work is constantly there but often disregarded. The digital divide is far more than the gap between those in urban areas and those in rural areas; between the educated and the uneducated; between socioeconomic groups; and, globally, between the more and less industrially developing countries.

What can this literature review teach us about digital inequality? It encourages digital researchers to explore the social positioning of women within a variety of societal structures and for the policymakers to consider the overwhelming role of a working woman. Gender-sensitive policies are required to ensure that women benefit from the advances in modern technology. As part of a future research agenda, the authors would like to suggest the following.

Firstly, it is not just about digital equality but digital equity. Digital inclusion researchers should transcend the mainstream belief that society's purpose should be equality rather than equity. This belief, however, ignores the substantial differences in resources and treatment that already exist in the digital economy between men and

women. To give everyone a fair chance to succeed, we must accept that we all begin at various points along the path. From there, we must identify that such "different starting places" are tied to privilege and marginalization categories, which in this study are based on gender. Only then can we begin to challenge and disrupt the structures that are accountable for these inequalities' construction and preservation and therefore strive toward equity.

Digital equity is defined as equal access and opportunity to digital tools, resources, and services to increase digital knowledge, awareness, and skills (Davis et al., 2007). This includes fair resource allocation based on needs, access to and distribution of technology and the Internet, and unbiased and uncensored content. It also refers to having the requisite knowledge, abilities, and understanding to use these resources to achieve working goals effectively. As a result, digital equity is increasingly considered a civil rights problem of the 21st century. Indeed, digital equity is a critical determinant in bridging the gender gap in the digital economy.

Then, digital inclusion is about a community of diverse capabilities rather than great technologies.

Researchers in the field of information systems (IS) should increase their understanding of human entities that interact first with one another and then with objects to achieve specific goals in the organization and society. Digital inclusion must go hand in hand with the people-centered digital transformation. Frankiewicz and Chamorro-Premuzic (2020) argue that digital transformation is less about technology and more about people, contrary to common belief. Putting it simply, even the most brilliant innovation is useless if one does not know how to utilize it, and even the most outstanding human brains will become obsolete if they do not collaborate with technology. The primary lesson is that when leaders consider investing in technology, they should first consider investing in the people who can make it useful. From a gender perspective, leaders must consider complimenting capabilities, and providing just opportunities to men and women, thus bridging the talent supply and demand gap and futureproofing everyone's potential.

Lastly, it can assist the passage from the digital divide to digital inequity. The research on digital inequity should move beyond a simplistic notion of the digital divide focusing on the accessibility and usage of technology within particular categories of the population. While it is helpful to map out the obvious, most visible divides, as the authors did in this paper, it is essential to note that digital inequity is closely entangled with socio-cultural factors rather than being entirely due to unequal technology distribution among men and women.

Practical Recommendations From the Literature

Level 1 Digital Divide: Gender and Digital Accessibility

The findings imply that the pandemic's disproportionate impact on women-led companies is particularly pronounced in nations with unequal gender distribution (Liu et al. 2021). Access to funding for women business owners and rebalancing household responsibilities, which tend to harm women more than men, are examples of effective policies.

When establishing programs and policies aimed at improving and enhancing digital inclusion and transformation for organizations, considerations such as cyber security and privacy should be considered. As a result, policymakers should look beyond unidimensional examination. The subjectivity of human beings behind the label of 'users' must be considered by technology designers and providers, who must consider how gender, race, class, and other structural constraints may constrain individuals' space of opportunities and capabilities, and thus how digital technology may impact their lives (Zheng and Walsham, 2021). Lack of social capital and support, for example, may make it difficult for working-class women and migrants, and refugees to use cellphones to locate better employment possibilities or apply for social assistance. As a result, bridging digital inequality necessitates technologies and skill training, associative treatments, and supporting networks that address some of the disadvantaged populations' inherent weaknesses.

Level 2 Digital Divide: Gender and Digital Literacy

To lessen the setbacks in regional places, governments should pay attention to the gender mix and levels of digital literacy of regional SME owners/managers, including their personnel. According to recent research, female entrepreneurs' educational attainment boosted the favorable impact of digital transformation on SMEs' financial performance during the COVID-19 pandemic. As a result, targeted technological training for female company owners/managers might help them improve their critical thinking and digital skills, which are crucial for making decisions during times of crisis like COVID-19.

Level 3 Digital Divide: Women Working From Home and Family Role

Regarding gender inequality, women are becoming an increasingly susceptible section of the labor market across national settings as the pandemic imposes additional responsibilities such as distant schooling and childcare, despite a range

of governmental interventions (Robinson et al., 2021). During the pandemic, the level 3 digital gap investigates the problem of working moms, when many women are asked to undertake additional responsibilities such as homeschooling, childcare, and battling labor inequities. During outbreaks, various countries take different approaches to reducing the crises' impact. In terms of public policies, for example, Denmark prioritizes childcare provisioning, whereas Germany delays the reopening of childcare facilities, and the United States generally depends on private-sector efforts. These contradictory policy agendas are supported by fundamentally diverse "cultural infrastructures," according to the results. Therefore, new solutions for addressing digital gender inequality within socio-cultural realms are needed to assist narrow the digital transformation and inclusion gaps.

LIMITATIONS

For our literature selection, we chose publications following the best practices for performing systematic literature reviews (i.e., Tranfield et al. 2003). While following these guidelines and using carefully chosen keywords gives us confidence that our evaluation covers the most comprehensive spectrum of literature available to date, we cannot completely rule out the potential that we may have unintentionally overlooked an article. In addition, while the authors' team constructed the three levels of the digital divide, the first author was responsible for the selected articles' underlying coding, which might be a drawback. Other categories are conceivable, even if we think the three emerging levels are adequate. The timeframe can also be limiting because it only includes the pandemic period. Further studies could benefit from it by incorporating the pre and post-pandemic scenarios. Lastly, future research will have to test the most dominantly applied algorithms in promoting inclusivity and diversity through the Internet of things from management and organization studies or neighboring disciplines other than those presented here.

CONCLUSION

In conclusion, when designing future online jobs, women's familial and socio-cultural backgrounds, as well as their values and family roles, need to be considered to ensure digital equality. The first-level digital divide refers to Internet access and material access. The second includes the actor's know-how in using computer devices, software, and equipment. The current study systematically indicates that, despite worldwide technological developments, the first and second levels digital divide have not vanished and remains a severe problem for working women from home,

revealing the fundamental aspect of women's unpaid care work as a determinant of exclusion. As a result, since digital inequality is rooted in societal structural inequalities, it is critical not to let the overemphasis on digital accelerations divert attention away from the more fundamental and long-standing issues of women's exclusion, and segregation, unfortunately begins at home.

Understanding the concept of the digital divide and its various perspectives, as well as the various ways in which not everyone benefits equally from technology, will help to determine evident technology needs, which will lead to the development of more coherent frameworks and policies to address those concerns, as well as increased efforts and awareness to reduce and bridge digital gaps. In this information age, one thing is sure: narrowing the digital divide is the first step toward bridging the development gap.

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APPENDIX

Table 1. List of samples

	Authors	Title	Year of Publication	Journal	Context
1	Alam et al.	Digital Transformation among SMEs: Does Gender Matter?	2022	Sustainability	Australia
2	Dlamini	Gender-based violence, twin pandemic to COVID-19.	2020	Critical Sociology	Global Survey
3	Dunn et al.	Gender Differences and Lost Flexibility in Online Freelancing During the COVID-19 Pandemic	2021	Frontiers in Sociology	United States
4	Frei-Landau & Avidov-Ungar	Educational equity amidst COVID-19: Exploring the online learning challenges of Bedouin and Jewish Female Preservice Teachers in Israel	2022	Teaching and Teacher Education	Israel
5	Grau-Sarabia & Fuster-Morell	Gender approaches in the study of the digital economy: a systematic literature review	2021	Humanities and Social Sciences Communications	
6	Liu et al.	COVID-19 and women-led businesses around the world.	2021	Finance Research Letters	24 countries
7	Lopez-Ercilla et al.	The voice of Mexican small-scale fishers in times of COVID-19: Impacts, responses, and digital divide	2021	Information and Organization	Mexico
8	Manolova et al.	Pivoting to stay the course: How women entrepreneurs take advantage of opportunities created by the COVID-19 pandemic.	2020	International Small Business Journal	
9	Mathrani et al.	Digital divide framework: online learning in developing countries during the COVID-19 lockdown	2021	Globalization, Societies and Education	India, Pakistan, Bangladesh, Nepal and Afghanistan
10	Mendonça et al.	Telework and Mental Health during COVID-19	2022	International Journal of Environmental Research and Public Health	Portugal
11	Niner et al.	The pandemic push: can COVID-19 reinvent conferences to models rooted in sustainability, equitability and inclusion?	2020	Socio-Ecological Practice Research	

continued on following page

Table 1. Continued

	Authors	Title	Year of Publication	Journal	Context
12	Pérez-Escolar & Canet	Research on vulnerable people and digital inclusion: toward a consolidated taxonomical framework	2022	Universal Access in the Information Society	Spain
13	Portillo et al.	Self-perception of the digital competence of educators during the COVID-19 pandemic: A cross-analysis of different educational stages.	2020	Sustainability	Basque Country
14	Robinson et al..	An Unequal Pandemic: Vulnerability and COVID-19	2021	American Behavioral Scientist	
15	Rodríguez-Rivero et al.	Is it time for a revolution in work-life balance? Reflections from spain	2020	Sustainability	Spain
16	Sarrasanti et al.	Its about Time We Care about an Equitable World: Women's Unpaid Care Work and COVID-19	2020	IEEE Engineering Management Review	Indonesia
17	Seo et al.	Informal Technology Education for Women Transitioning from Incarceration	2021	ACM Transactions on Computing Education	United States
18	Towns et al.	Covid-19 and gender: A necessary connection in diplomatic studies	2020	The Hague Journal of Diplomacy	
19	Velicu et al.	Socially isolated and digitally excluded. A qualitative exploratory study of the lives of Roma teenage mothers during the COVID-19 lockdown	2022	Technology in Society	Romania
20	Zheng & Walsham	Inequality of what? An intersectional approach to digital inequality under Covid-19	2021	Information and Organization	

Chapter 4
The Journey Towards Harnessing Frontier Technologies:
Becoming a Digital Firm With Digital Capability and Dexterity

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ABSTRACT

As the digital era unveils, it has become a must for many business firms to redesign their existing business processes to utilize the frontier technologies to become competitive. However, "digital transformation" has received less attention in prior literature, and no clear pathway to a successful digital transformation has been provided. This chapter builds on 12 in-depth interviews with top-level decision-makers of Sri Lankan business firms to develop a digital transformation model. The findings reveal that the solid foundation of a digital business firm relies on a "digital-first" mindset and three success pillars reflecting unique organizational characteristics (e.g., digital business transformation strategy, workforce, and firm resources) that collectively enable digital capability and dexterity. This chapter further argues that digital capability and dexterity are the critical hallmarks of a truly digital firm in a digital economy where technologies continue to improve exponentially.

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INTRODUCTION

Over the last three decades, technology has embarked on the voyage of digital transformation in business firms worldwide (Verhoef et al., 2021; Vial, 2021). The concepts of the Internet of things, blockchain and cryptocurrency, big data analytics, artificial intelligence and machine learning, quantum computing, and robotic process automation are empowering business firms operating in all sectors, including manufacturing, tourism and hospitality, banking and finance, retail, healthcare, and other service sectors (Vidmar et al., 2021). Consequently, today, managers in most business firms are constantly pressured to make strategic choices about exploiting the emerging frontier technologies to achieve a sustainable competitive advantage in the long run. As prior literature reveals, in most instances, business firms aiming to transform themselves into digital often focus on how to effectively utilize frontier technologies to achieve specific business objectives (e.g., how can we provide our service via a mobile application? how do we increase our likes on Facebook? etc.) (Verhoef et al., 2021; Tavoletti et al., 2022). However, most scholars have recently emphasized that a business firm cannot achieve a sustainable competitive advantage by simply adopting the technology itself (Kraus et al., 2021; Vidmar et al., 2021). Instead, a business firm should know how to utilize technology to transform the way it does business effectively (Tavoletti et al., 2022), disrupting established value chains and business models.

Research Gap

Although the notion of *"digital transformation"* has recently emerged as a buzzword, many business firms in the South Asian region are struggling with progress and still have a long way to go (Rhee et al., 2022), and Sri Lanka is not an exception. Similar to most business firms in the South Asian region, although the business firms in Sri Lanka are talking about the sophisticated technologies they are planning to offer, in most instances, these firms lack the skills and the mindsets needed to deal with this transformation effectively (Rassool & Dissanayake, 2019). Given the pace of change and the pressure to adapt, although some business firms in Sri Lanka have put in massive investments and efforts, most of these firms have fallen short of achieving successful digital transformation due to organizational barriers and shortcomings related to resistance to change (Fairooz & Wickramasinghe, 2019; Jayalath & Premarathne, 2021). On the other hand, despite the hype of the *"digital transformation"* notion, it has not been comprehensively studied in the business management literature (Nadkarni & Prügl, 2021; Verhoef et al., 2021). More specifically, little attention is paid to understanding a business firm's approach to becoming digital by initiating digital transformation efforts (Hanelt et al., 2021).

However, a business firm's approach to digital should be studied in-depth as it has an immense impact on the nature of work, the spectrum of jobs, how employees are managed, and how the business will achieve its goals (Tavoletti et al., 2022). This chapter addresses these voids by addressing the following research question: What organizational changes and characteristics are associated with a business firm's journey toward becoming a *"digital master?"*

This chapter attempts to answer the research question by proposing a digital transformation model based on 12 in-depth interviews with top-level decision-makers of 12 business firms representing diverse business sectors in Sri Lanka. While prior information system (IS) literature has contributed to increasing the understanding of the notion of digital transformation and its necessity to remain competitive in the digital world (Nadkarni & Prügl, 2021; Vial, 2021), this chapter furthers our understanding of the organizational changes and characteristics associated with successful digital transformation.

THEORETICAL BACKGROUND

The following section discusses the resource-based view (RBV) theory from which this chapter draws its theoretical foundation. In addition, the key theoretical concepts related to the research problem are reviewed critically.

Resource-based View (RBV) Theory

The RBV theory has been extensively used within the IS literature to explain how business firms can achieve competitive advantage and superior performance (Pereira & Bamel, 2021). At the core of the theory is that outstanding firm performance is attributable to resources and skills that are firm-specific, rare, and difficult to imitate by rival firms (Barney, 1991, 1996). Consequently, as Barney (2001) accentuates, business firms can achieve a competitive advantage by acquiring or developing organizational capabilities that are rare, non-substitutable, and not subject to imitation. Furthermore, the theory assumes that skills, capabilities, and other resources that business firms possess differ among business firms and that such resources are the primary determinants of firm performance. Thus, business firms that can identify the characteristics of resources or capabilities that are not subject to imitation by competitors will attain sustainable competitive advantage (Barney, 2002; Barney & Clark, 2007).

Consistent with the RBV theory, recent IS literature has identified digital capability as a critical organizational capability that demonstrates the characteristics of rarity, non-substitutability, and non-replicability that can initiate digital transformation

fostering superior firm performance (Chaudhuri et al., 2021). However, when investigating how digital capability leads to outstanding performance, evidence suggests that outcome variations in firm performance may be explained by how digital capability leverages the value of other firm resources and capabilities in their digital transformation efforts (Hanelt et al., 2021). Based on prior IS literature, the perspective taken in this chapter is that digital capabilities are valuable resources; however, these digital resources may not solely contribute to enhancing firm performance in the long run. Instead, structural organizational changes and characteristics are required to foster digital capability.

Digital Capability and Digital Transformation

Digital capability can be broadly defined as a business firm's skill, talent, and expertise to manage digital technologies to exploit novel business opportunities and be competitive. Possessing digital capability implies the ability of a business firm to transition emerging digital transformation (Tavoletti et al., 2022).

Digital transformation is one of the most critical technology trends the business world witnessed in recent years (Nadkarni & Prügl, 2021; Vial, 2021). It is more than process automation; it fundamentally creates structural changes within a business firm by radically changing the nature of the relationships between business processes, employees, data, and information systems (Hanelt et al., 2021). When business firms are constantly transforming and evolving in response to changing business landscape and emerging frontier technologies, digital transformation is the changes built on the foundation of digital technologies, ushering unique changes in business operations, business processes, and value creation (Tavoletti et al., 2022). Through digital transformation, business firms can integrate digital technologies in many facets of their operations and are also able to engage customers with emerging digital innovations (Hanelt et al., 2021; Kraus et al., 2021). Moreover, prior IS literature indicates that business firms that have successfully applied digital transformation are superior at generating revenue using their existing resources (Kraus et al., 2021; Nadarni & Prügl, 2021).

Soule et al. (2016) suggest that successful digital transformation supports three clusters of digital capabilities: customer experience, operational excellence, and workforce enablement. Digital transformation allows business firms to use digital technology to deliver superior customer experience or integrate digital channels for real-time customer communication and interaction (Kraus et al., 2021). Digital transformation further facilitates business firms to excel in operations through optimizing, automating, or streamlining internal business processes with more precise and timely data (Nadarni & Prügl, 2021). Soule et al. (2016) further suggest that digital transformation facilitates collaboration across conventional organizational

boundaries allowing employees to share knowledge with suppliers and business partners in different geographical locations and time zones.

Since organizational changes and characteristics that drive digital capability in the short term will result in digital dexterity in the long term (Soule et al., 2016), business firms that have embraced digital transformation should achieve digital dexterity and sustain digital capability over time to be competitive.

Digital Dexterity

Digital dexterity is the hallmark of a business firm that is becoming digital by initiating digital transformation (Nadkarni & Prügl, 2021). Digital dexterity enables a business firm to flexibly adapt its roles, responsibilities, and relationships. A business firm with a high level of digital dexterity can leverage emerging frontier technologies quickly in responding to changing customer expectations, industry shifts, or internally-driven strategies (Soule et al., 2016). Successful experiences reinforce more fluid and collaborative ways of working within business firms, which support sustained digital capability and substantial business performance in the long run (Sousa & Rocha, 2019).

RESEARCH METHOD

This chapter was explorative by nature and used multiple-case design (Yin, 2014) to understand the organizational changes associated with a business firm's journey toward becoming a *"digital master."* Since the key rationale for using an exploratory research design is to gain new insights into a field where prior theory is underdeveloped (Eisenhardt, 1989), and the notions of digital capability and digital dexterity are relatively unexplored in the Sri Lankan context, it is decided to adopt exploratory research design for this study. Case studies were used for the data collection as it investigates an issue within a real-life context, drawing on the views from several sources, and they provide the means to review theory and practice iteratively (Baxter & Jack, 2008). Further, multiple cases ensure that common patterns are identified rather than generalized based on the peculiarities of the research setting.

The study was conducted at the firm level: the interviewees, representatives of their respective business firms, formed a unit of analysis (Yin, 2014). This chapter included twelve informants representing Sri Lankan business firms from various industries (see Table 1). Some informants represented born-digital firms, whose businesses were founded on the possibilities of digital technologies, whereas some other firms were experimenting with digital technologies. Further, five business firms had much more experience in utilizing digital technologies. The selected business

firms did not constitute a representative sample but illustrated the connection between digital dexterity, digital capability, and becoming digital in different industries in Sri Lanka.

A combination of snowball and purposive sampling is used in selecting the informants for the interviews according to their experience with technology utilization and availability (Patton, 2002). All the informants belong to top-level management, and their age varies between 38 and 57 years. They all had over eight years of professional experience in technology management (see Table 1). However, the selected informants were not statistically representative of a firm's members. Instead, they were knowledgeable about the topic of interest and were willing to discuss it. Once the selection had been completed, the potential interviewees were contacted. Once they had agreed to participate in the study, they received initial information about the study, including a shortlist of questions they answered before the interview. During the interviews, informants were mainly questioned about their organizational experiences of *"becoming digital,"* focusing on the business firms' structural, behavioral and cultural traits.

The interviews ranged from 90 to 135 minutes and were conducted over four months in 2021. The interviews were also performed in the Sinhala language in two instances, as two respondents did not feel comfortable answering the questions in English. An interview guide was used to ensure that similar topics were addressed and discussed in all interviews. The interview guide was pilot tested with two subject experts before the interviews to detect the questions' appropriateness and assess whether the interview guide would work in practice. All the interviews were tape-recorded with the consent of the informants and fully transcribed afterward.

Data Analysis

A thematic analysis was performed to explore the concepts that emerged from the interviews (Gamage et al., 2021). When identifying the key concepts and emerging themes, particular attention is paid to the pivotal quotations from the respondents confining their practical experiences. These quotations allowed the research team to identify the key themes and concepts that contained theoretical underpinning meaningfully. Multiple reviews and cross-checks were performed for accuracy and reliability during this process. First, the researcher and her two research assistants become familiarized with the data by listening to interview recordings and going through interview transcripts multiple times. Then the coding process was started using a shared codebook, allowing all three to follow each other's coding process. After the individual coding, the research team debated all emerged codes, their importance, characteristics, and uniqueness. Once the initial codes were finalized, the research team conducted a more in-depth analysis by comparing and contrasting

Table 1. Overview of the informants

Case	Industry	Stage of the Technology Utilization	Informant		
			Job Description	Age	Background
A	Customer Service	Born-digital firm	Senior manager - Digital marketing and operations	49	Owns a postgraduate qualification in information technology and has more than 10 years of experience in digital marketing and strategy development
B	Travel and Tourism	Maturity stage	Chief Executive Officer	51	Holds a MSc. in technology management and has more than 15 years of experience in technology management
C	Retail	Born-digital firm	Managing Director	38	Holds a PhD in digital marketing and strategy development and has more than 8 years of experience in technology management
D	Textile and Apparel	Introductory stage	Managing Director	43	Holds a professional postgraduate diploma in information technology and has more than 10 years of experience in digital strategy development
E	Travel and Tourism	Born-digital firm	Director - Digital marketing and operations	53	Has more than 15 years of experience in technology management and strategy development
F	Textile and Apparel	Maturity stage	Senior Manager - Operations	57	Owns a postgraduate qualification in information technology and has more than 25 years of experience in strategy development
G	Plastic and Rubber Products	Maturity stage	Managing Director	41	Holds a MBA and has more than 8 years of experience in technology management
H	Finance	Introductory stage	Senior Manager- Digital marketing and operations	46	Has more than 12 years of experience in e-commerce and technology management
I	Retail	Maturity stage	Senior Manager - Operations	55	Holds an MBA and has more than 20 years of experience in technology management
J	Food Processing	Born-digital firm	Managing Director	51	Has more than 10 years of experience in e-commerce and strategy development
K	Educational services	Maturity stage	Chief Executive Officer	47	Owns a postgraduate qualification in technology management and has more than 10 years of experience in digital business strategy development
L	Customer Service	Introductory stage	Managing Director	43	Holds a professional postgraduate diploma in information technology and has more than 10 years of experience in strategy development

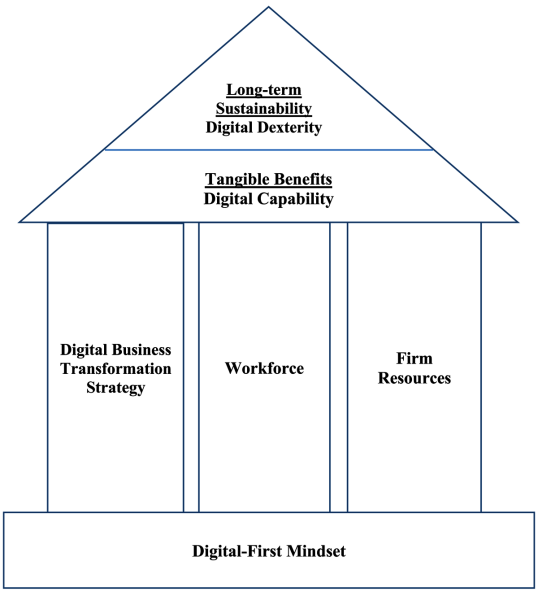
Source: Prepared by the author

the codes more carefully to identify the themes that emerged from the codes. After several rounds of detailed discussions designing different frameworks and visual drafts aligned with extant literature, a consensus is reached to build the conceptual framework shown in Figure 1.

KEY FINDINGS AND RECOMMENDATIONS

Based on the RBV theory, synthesis of the literature review, and findings of the qualitative interviews, this chapter proposes a digital transformation model (see Figure 1) by providing insights into the building blocks required for a business firm to build its journey toward becoming digital. As indicated in Figure 1, the starting point of the model is the *"digital-first"* mindset that provides a solid foundation for a digital firm. Grounded on the solid foundation of a *"digital-first"* mindset, the three main success pillars of a digital firm are built up, as shown in Figure 1. These three pillars reflect unique organizational characteristics: digital business transformation strategy, workforce, and firm resources. Further, these three pillars can develop at different times, strengthen to varying rates within business firms, and are interdependent and mutually reinforcing. As the figure reveals, a business firm's journey toward becoming digital will most likely to fail without the solid

Figure 1. Digital Transformation Model for a Digital Firm
(Source: Prepared by the author)



foundation of a *"digital-first"* mindset and the support and proper integration of the three success pillars. Consequently, it is paramount to understand the solid foundation and each pillar's role in detail before any business firm embarks on becoming digital. Further, as shown in Figure 1, the solid foundation of a *"digital-first"* mindset and three pillars collectively enable digital capability and dexterity within a business firm, thus leading to successful business transformation.

- ***"Digital-First"* Mindset:** As the findings uncover, a key distinguishing characteristic of a digital firm is the *"digital-first"* mindset. A digital-first mindset can be defined as an attitude that reflects a business firm's broad tendency to seek digital solutions when approaching any new opportunity or problem. During the interviews, almost all the respondents unanimously emphasized that business firms embracing emerging frontier technologies will be guaranteed better chances of success than those who stand still and follow the status quo. The managing director of a born-digital firm operating in the retail sector emphasized that:

Winning in the digital race is all about creating more effective business models and not simply deploying technology. To win, you need to adopt a digital-first mindset, making the digital way of doing business the only way. (Respondent C)

During the interviews, it was further revealed that some business firms think of digital as a piece of technology that they need to add to their existing business processes to become *"more digital."* These business firms demonstrate a more reactive approach to becoming digital and can be considered digital laggards. An indicative sign of a digital laggard business firm is struggling to find use cases for technology deployment because it doesn't want to change its existing business model for better experience and speed (Vial, 2021). Instead, digital laggards wish to automate or optimize the status quo. However, it was revealed that business firms with a digital-first mindset ultimately have a different way of approaching their journey towards becoming digital. They don't start their journey by deploying technology. Instead, they transform their current business models in such a way to deliver their products and services to the customer the fastest with the least friction, disrupting the status quo. Our findings align with Kraus et al. (2021), who stressed that such a business model redesign and transformation mandate integrating emerging technologies because it is faster and has less friction. Consequently, today, the digital-first mindset is rapidly becoming the standard in the competitive business environment, allowing a business firm to stay competitive and avoid getting lost in the shuffle. As the managing director of a born-digital firm operating in the food processing industry emphasized:

A digital-first mindset allows a company the best chance of catching up with industry leaders and even becoming the industry leader itself. (Respondent J)

- **Digital Business Transformation Strategy:** A digital business transformation strategy is a detailed framework that specifies how a business firm properly integrates digital technologies, tools, and competencies across all levels and functions to achieve organizational goals in a staged and strategic manner (Verhoef et al., 2021). During the interviews, most respondents echoed that having a digital business transformation strategy is necessary for any business firm that wishes to embark on a journey toward becoming digital. As respondent B highlighted, three behavioral norms (e.g., digitalized business processes, collaborative learning, and data-driven decision-making) are evident in a digital firm. These three norms collectively strengthen a business firm's near-term digital capabilities while simultaneously supporting implementing the digital business transformation strategy with transparency, adaptability, and resilience for the longer term.
- **Digitalized business processes:** Business processes are the blueprint through which a firm achieves its goals and objectives. Business processes break down major business activities within a business firm into a series of distinct, repeatable tasks to achieve greater consistency and reliability, which makes the need for business processes to be transparent, efficient, and adaptable (Tavoletti et al., 2022). However, during the interviews, it was revealed that often, most business firms do not have well-designed and defined processes. As the managing director of a customer service firm states, business processes are vaguely defined in the firm he works for without a clear sense of forethought or a fundamental understanding of how each process fits into the organizational structure. Consequently, most of its business processes are loaded with repeatable, non-value-added activities without proper cross-functional integration. He further echoed that:

Inefficient business processes and outdated process models can hinder a company's digital transformation initiatives, impeding the ability to stay ahead of evolving customer demands. (Respondent L)

Most respondents understand digitalizing business processes do not mean simply automating existing processes. Instead, a business firm must re-engineer the entire business process, including cutting the number of steps required, reducing the number of documents, developing automated decision making, and dealing with regulatory and fraud issues. Further, process models, organizational structures, and roles and responsibilities of employees must be redesigned to match the re-engineered

business processes. As the director of digital marketing and operations of a travel and tourism firm states:

Digitizing business processes often requires old wisdom combined with new designs, for example, eliminating organizational silos and fostering collaborative learning for a better customer experience. (Respondent H)

The interview findings broadly align with Hanelt et al. (2021), who accentuate that digital transformation fundamentally creates structural changes within a business firm by radically changing the nature of the relationships between business processes, employees, data, and information systems.

- **Collaborative learning:** Most respondents accentuated that successful digital business transformation strategy deployment depends on how much a business firm cultivates collaborative learning. Collaborative learning enables employees of a traditional business firm to collaborate to innovate, solve problems, and identify and exploit new business opportunities crossing the conventional functional boundaries. The director - digital marketing and operations of a born-digital firm in the travel and tourism industry describes how collaborative learning enables the business firm in its journey toward becoming digital as follows.

Employees have a natural way of working across boundaries interdependently, which does not resemble a conventional organization chart. At the very beginning, we decided not to have stringent business lines, business groups, and those vertical silos in our firm. In this way, we were able to initiate a business climate that fosters collaborative learning by utilizing appropriate technologies adequately. (Respondent E)

- **Data-driven decision-making:** As respondent L accentuated, many business firms recently made strategic moves to build or enhance their data cultures, enabling employees to make better, faster decisions as they faced unprecedented challenges. Most respondents stressed that using quality data (i.e., accurate, reliable, updated, and complete data) could void judgments based on bias and false assumptions that lead to poor decision-making within business firms. Consequently, moving ahead, data-driven decisions will outweigh decisions based on biased judgments and gut feelings. As the senior manager - operations of a mature retail firm commented:

Digital technology is the backbone of our operations as a retail firm. We basically capture everything that happens in our retail outlets. Further, we capture every click on our website. We capture every piece of each transaction, whether online or offline and store all that data in our backend databases that can be accessible to any employee involved in operations improvement projects. All of the decisions that we make and basically all of the ways that we operate are 100% driven by data and analytics. (Respondent I)

Further, in line with Sousa and Rocha (2019), it was uncovered in the interviews that collaborative learning is facilitated through data-driven decision-making. This is because data will increasingly intersect the employees, business processes, and technologies that firms rely on for strategic success.

- **Workforce:** In line with the RBV theory (Barney, 1991), as uncovered in the interviews, the success of digital transformation initiatives depends on the tangible and intangible resources a business firm owns. Since the workforce intersects and interwoven both tangible (i.e., assembled workforce) and intangible resources (i.e., intellectual capital) uniquely, this section exclusively discusses the role of the workforce in digital transformation. As identified during the interviews, a business firm that wishes to become digital never restricts its *"workforce"* only to its internal employees. Instead, it broadly defines its workforce, acknowledging the contributions of its principal stakeholders, including employees, suppliers, business partners, and customers, who play essential roles in a business firm. As the technology evolves, a digital firm seeks collaborative opportunities both within the firm and beyond its borders through seamless communications and interactions. Three characteristics of this extended workforce (e.g., digital skills, digital literacy, and work engagement) play pivotal roles in digital firms as technology evolves.
- **Digital skills:** During the interviews, it was uncovered that a business firm with a digital-skilled workforce is more likely to become successful in becoming digital. Digital skills can be broadly defined as the skills needed to use digital devices, communication applications, and networks to access and manage information, ranging from basic online searching and emailing to specialist programming and development. As the senior manager of operations of a retail firm highlighted:

As we deal with enormous amounts of data each day, we need a workforce with the skills to implement digital initiatives to collect, store, and retrieve that data to maximize its use. (Respondent I)

Further, the managing director of a born-digital food processing company states that digital skills have been critical to business firms and the workforce as the competitive business environment is moving towards a universal shift to digital-first interactions like remote work, online commerce, and virtual collaboration. This drastic change has produced many benefits for business firms, like greater flexibility for the workforce and removing geography as a barrier when hiring new employees and finding suppliers and business partners.

- **Digital literacy:** Digital literacy is more than digital skills; it includes various social, ethical, and reflective practices embedded in work. Technically speaking, digital literacy refers to the ability of a workforce to use and understand information and communication technologies (i.e., internet platforms, social media, and mobile devices) to find, evaluate, create, and communicate information required in work in today's digital society (Kozanoglu & Abedin, 2020). As the chief executive officer of an educational services firm highlighted:

We're definitely going to need people who can understand enormous data sets and how to interpret that data by analyzing it meaningfully. (Respondent K)

- **Work engagement:** During the interviews, most respondents emphasized that in the recent past, portal platforms, collaboration tools and technologies, and intranet point solutions have evolved to meet the needs of a digital firm better. However, limiting a digital firm to just technology is not painting the entire picture. While technology certainly plays a significant role in a digital firm, digital technology must be supplemented with cultural change to facilitate its workforce to accept this transformation (Kozanoglu & Abedin, 2020). As senior manager in digital marketing and operations of a finance firm has stated, a digital firm can engage with its workforce more personally.

A digital firm provides a unified tool for all its main stakeholders to use and connect, ensuring that every member, from external suppliers to frontline employees to top-level management, is connected. This encourages seamless communication and facilitates a business firm to achieve its goals and objectives without hurdles or bottlenecks. (Respondent H)

- **Firm Resources:** This section focuses on the tangible and intangible resources required for successful digital transformation, except the workforce. Concerning critical tangible and intangible resources required, it was identified that digital tools, technologies, data, and financial resources are essential

inputs to the functioning of a digital firm. In line with Barney (1991), three firm-specific, non-imitable resources (e.g., real-time integrated operational data, collaborative tools and technologies, and financial resources) that permit intense information processing and foster broad social connections with the extended workforce of a digital firm are identified during the interviews.

- **Real-time integrated operational data:** The interviews exposed that real-time operational data stemming from dispersed and multiple sources stored in a single, wide-reaching system (i.e., data warehouse) allows a business firm to manage all its processes in a centralized and secure manner without unnecessary delays and bottlenecks. Such an initiative allows a business firm to access and analyze the data in real-time, interpret, and refine it into actionable business insights that the workforce can use to understand how well the process is performing and where it can be refined for even more exceptional performance. Concerning the pivotal role real-time operational data integration plays in a business firm facilitating its journey towards becoming digital, the chief executive officer of a travel and tourism firm stressed that:

If there is a company with the ambitions of being a digital firm with a high level of agility, a real-time integrated data warehouse can help. (Respondent B)

Moreover, it was revealed that real-time operational data integration is indeed a necessity for a business firm that works with multiple suppliers and business partners from different destinations. As the managing director of a born-digital firm emphasized:

When there are time lags in data processing, discrepancies and conflicts can occur. It is easy for a business firm to become compartmentalized and break off into silos with everyone working away in different locations and directions. However, this can be detrimental in the long term. Real-time operational data integration bridges these gaps. (Respondent C)

- **Collaborative tools and technologies:** As revealed in the interviews, collaborative tools and technologies better facilitate and support communication, collaboration, and rapid feedback within a business firm. The managing director of a born-digital food processing firm states that:

Our company uses a common social platform for real-time messaging from the CEO and the executive staff to ground-level workers. We now do many authentications and approval processes through mobile phones bypassing the more formal ways

things traditionally got done. There's just a flow of contingent information via email, instant chat, and texting that creates immediate awareness and builds real-time alignment around goals and procedures. We make the company much more fluid with fewer silos and more real-time information as goals get set and cascade through the company instantly. (Respondent J)

Further, endorsing Sousa and Rocha's (2019) view, most respondents underlined that collaborative tools and technologies cultivate an organizational culture that promotes collaborative learning and data-driven decision-making within business firms.

- **Financial resources:** Most respondents emphasized that they face more difficulty securing financial support for their digital initiatives as they advance, especially in today's competitive business environment, when growth-oriented investments are more important than ever. The managing director of a plastic and rubber products manufacturing company states that identifying funding sources for digital transformation requires a more creative and innovative approach. As he went to explain further,

While immediate return on investment possibilities can be shown with tactical demand management programs, strategic return on investment is more structural and challenging. It requires a clear understanding of which digital capabilities business firms require to compete in the new digital society and how to best leverage technology-enabled reengineering to develop these capabilities by replacing less effective and efficient legacy approaches. (Respondent G)

All in all, during the interviews, it was found that a *"digital-first"* mindset and the three success pillars may develop at different times and strengthen at varying rates within a digital firm. Further, as shown in Figure 1, these four building blocks are interdependent and mutually reinforced, enabling digital capability and dexterity within a business firm. Based on the interview findings, the following section describes how each component of a digital firm contributes to building digital capability and developing digital dexterity.

- **Tangible Benefits - Digital Capability:** In line with Soule et al. (2016), during the interviews, it was uncovered that most business firms seek to develop digital capabilities to improve operational excellence, establish workforce enablement, and enhance customer experience.
- **Operational excellence:** As revealed in the interviews, digital capabilities to improve operational efficiency rely most heavily on the presence of digital

skills and established digitalized business processes. The senior manager of digital marketing and operations of a born-digital firm in the customer services sector accentuates that real-time integrated operational data sets the stage for various initiatives for operational efficiencies, such as predictive analytics, value chain optimization, or lifecycle management. Moreover, it was revealed that when a digital-first mindset prevails, the workforce within a business firm is more likely to use any available digitalized operational data, consequently strengthening the norms of date-driven decision-making and more collaborative learning.

- **Workforce enablement:** The analysis validates Soule et al.'s (2016) views on becoming digital by demonstrating that digital capabilities to establish workforce enablement are associated with real-time integrated operational data, collaborative tools and technologies, digitalized business processes, and digital skills. This combination of work practices and firm resources enables an extended workforce to reinforce collaboration beyond traditional workplace boundaries to enhance customer experience.
- **Customer experience:** Most respondents stressed that digital capabilities to enhance customer experience are strongly influenced by a digitally skilled workforce, real-time integrated operational data, and a solid organizational culture that cultivates data-driven decision-making. These characteristics enable business firms to deliver superior customer services without any delays. Moreover, during the interviews, it is exposed that having a digital-first mindset is also highly related to fostering digital capability in customer-facing front-end activities.
- **Long-term Sustainability - Digital Dexterity:** As uncovered in the interviews, digital dexterity, which refers to the ability of a business firm to rapidly self-organize to deliver new value from digital technologies, relies heavily on the combination of the digital business transformation strategy, workforce, and firm resources. Most respondents emphasized that digital dexterity is a vital characteristic of a mature digital firm. It is driven by cultivating a robust organizational culture that fosters collaborative learning, data-driven decision-making, and a growing digitally-skilled workforce. As the managing director of a textile and apparel manufacturing firm stated:

Collaborative learning is a powerful characteristic that harnesses widespread digital skills to enable workforce engagement and the development of a digital-first mindset. Collaboration within or beyond the organizational boundaries is vital for greater digital dexterity. (Respondent F)

Interestingly, the findings are consistent with Soule et al. (2016), who highlighted that the characteristics most important for developing digital dexterity build on those characteristics that drive digital capability within business firms. However, it is important to note that although many business firms exhibit digital capability, only some exhibit digital dexterity, which has become necessary to sustain business success in the rapidly evolving digital world.

Managerial Implications

Although each business firm's journey toward becoming digital is different, the interview findings point to common experiences that will be useful for industry practitioners and business firms who want to embark on becoming digital. Industry practitioners must acknowledge that changing workforce experiences, skills, and attitudes are central to this journey. Accordingly, they need to initiate change management efforts to ensure traditional mindsets, practices, and resources evolve into digital mindsets, practices, and resources at every level and within every function of a business firm. This combined attention to both digital and human capital, coupled with fostering collaborative learning and data-driven decision-making, underpins the development of the digital dexterity necessary for a business firm to become competitive in the rapidly evolving digital society. Moreover, industry practitioners can use the proposed digital transformation model (see Figure 1) as a blueprint to guide their journey toward becoming digital. The model outlines key features of a digital firm and what are the most vital organizational characteristics to be fostered. Since each business firm's journey toward becoming digital is unique, developing a model that fits any business firm is challenging. However, the proposed model will allow a business firm to identify where it stands in its journey and show common experiences and concerns shared by other business firms in similar circumstances. Any business firm can adapt the proposed model as it embarks on the journey toward becoming a digital firm. By doing so, industry practitioners can use digital transformation to promote inclusivity and diversity within business firms. In sum, industry practitioners and business firms should prepare themselves for a typical *"S-curve"* pattern during their journey towards becoming digital: a slow start, followed by a steep improvement before plateauing at a new level of digital capability and dexterity.

FUTURE RESEARCH DIRECTIONS

As with any research, this study also has its limitations. The main limitation of this study was the restricted number of informants interviewed for the data collection from a single country context (i.e., Sri Lanka). In this respect,

more insights could be gained in the future by conducting a study with more respondents or diversifying the sample, taking more business firms from cross-country contexts into account. In general, further analyses are certainly needed to determine the importance and influence of a *"digital-first"* mindset, digital business transformation strategy, workforce, and firm resources on a business firm's journey towards becoming digital. Moreover, the cohesion of the aforementioned constructs and the mutual relationships between their elements need to be explored. Further research should also be aimed at measuring the strength of these relationships and identifying cause-effect relations to provide industry practitioners with recommendations necessary to build up the potential of their business firms to become digital.

CONCLUSION

In summary, there are no common pathways and policy guidelines for becoming a digital firm. Every business firm's journey toward becoming a digital firm is a unique experience. Its solid foundation relies on a *"digital-first"* mindset and three success pillars that reflect distinctive organizational characteristics (e.g., digital business transformation strategy, workforce, and firm resources) that collectively enable digital capability and dexterity. Further, becoming digital is not a simple, linear process. Yet any business firm can become digital by having the solid foundation of a *"digital-first"* mindset and the support and proper integration of the three success pillars. The development of digital dexterity and capability is therefore seen as a way to become digital for most business firms. As a concluding remark, it can be stated that a blend of a *"digital-first"* mindset and digital business transformation strategy, workforce, and firm resources, drive digital capability in the short term and digital dexterity in the long term.

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KEY TERMS AND DEFINITIONS

Business Model Transformation: An umbrella term for making fundamental changes in how a business firm runs, focusing mainly on human resources, business processes, and technology deployment.

Business Process Redesign: Is the radical redesign of the critical business processes to achieve organizational goals by cutting operational costs and removing process redundancies significantly.

Digital Capability: Refers to the skills and attitudes that business firms need to thrive in today's digital society.

Digital Dexterity: The ability of employees to adapt and adopt emerging technologies to achieve operational excellence and produce better results for their business firms.

Digital Firm: A business firm that executes its core business processes utilizing digital technologies.

Digital Transformation: A cultural, structural, and operational change of a business firm through proper integration of digital technologies, tools, and competencies across all levels and functions in a staged and strategic manner.

Digital-First Mindset: An attitude that reflects a business firm's broad tendency to seek digital solutions when approaching any new opportunity or problem.

Frontier Technologies: Emerging technologies that will reshape communications and industry standards by displacing existing business processes and providing urgently needed solutions to global challenges.

Chapter 5
Perceived Security Risk, Perceived Privacy Risk, and Perceived Trust of Mobile Payment Adopters and Non-Adopters:
Impact of the COVID-19 Pandemic

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ABSTRACT

With the COVID-19 pandemic, people have shifted to mobile payments enormously. However, cyber threats have increased simultaneously. Therefore, this chapter aims to investigate the dichotomous perceptions regarding mobile payments privacy, security, and trust within the adopter and non-adopter groups. An online survey was carried out among university students in Sri Lanka to collect the data. The independent samples test and the robust bootstrap methods were used to test the
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differences between adopters and non-adopters perceptions of mobile payments' privacy, security, and trust. The adopters have significantly higher perceived trust in mobile payments than the non-adopters. Further, adapters are twofold according to the usage level, the advanced users, and the laggards. This chapter provides unique and comprehensive insights into mobile payments user and non-user segments in Sri Lanka and the dichotomous nature of contactless payments' trust and risk perceptions. The findings will help banks design their marketing campaigns that suit the available customer segments in the market.

INTRODUCTION

The Covid-19 pandemic has been spreading throughout the world since 2019, causing changes in human behaviour to a vast extent. In the absence of proper treatment, all countries strictly observe preventive measures like wearing face masks and social distancing. As a measure of the latter, shifting from cash to digital payments, which was a medium of convenience, became necessary because physical cash handling can expedite the spread of the virus (Sreelakshmi and Prathap, 2020). In line with this, the World Health Organization (WHO) also recommended using digital payment methods instead of cash and contact-based payments. In addition to that, previous works during pandemic times (Daragmeh et al., 2021) confirm adoption of mobile payments as a way of social distancing can prevent the spread of the virus. Somehow, in Sri Lanka, mobile phone banking has increased from 65.6% in the fourth quarter of 2020 compared with the fourth quarter of 2019 (before pandemic) (Central Bank of Sri Lanka, 2021). The Central Bank of Sri Lanka also facilitated several electronic modes of payments as a measure of relief for the pandemic. Although the spread of the epidemic can be a positive factor or even a catalyst in the acceptance and development of digital payments (Mansour, 2021; Shahabi et al., 2020), the enormous rise of cyber threats was also witnessed within the country. A nearly 460 per cent increase in cybersecurity-related matters was recorded in 2020 compared with 2019 (The National CERT of Sri Lanka, 2021).

Ozdemir et al. (2008) reveals a decrease in internet banking, which appears to be primarily due to security risk and privacy risk concerns. So, banks should reduce the risk perception associated with using the service. Addressing these risk concerns has become a key challenge in the mobile banking context in Sri Lanka for years (Dandeniya, 2014). Even though the COVID-19 outbreak compelled people to make digital payments, everyone is not at ease with or even willing to use those (Undale et al., 2021). Therefore, there is a potential to occur a sharp fall of users unless banks are concerned about the security of apps (Undale et al., 2021). In this sense, the pandemic can potentially switch people from cash to mobile payment (m-payment)

and increase the digital payment users' cash handling intention once the pandemic is over. Therefore, it is salient to examine the risk perception of non-users and users related to mobile payments. Previous studies prove that adopters and non-adopters have different perceptions of the risk of any new technology, which influences their future usage intentions. According to Khanra et al. (2021), privacy concerns are associated with consumers' adoption or postponement of mobile payment services during pandemic times. Although over 57 million internet banking transactions were recorded in 2020, the volume of mobile banking transactions is approximately 27 million (Central Bank of Sri Lanka, 2021). This proves that a significant non-adopter segment still prevails in the mobile payment market. However, to accelerate the diffusion of mobile banking, identification of the dichotomous nature of the perceptions between adopter and non-adopter groups is vital (Ozdemir et al., 2008).

Moreover, Lee et al. (2005) highlight the need to segment the customer group further to identify their heterogeneous nature. In line with this, the purposes of this study are, are identified as 1) to understand the differences between adopters' and non-adopters perceptions related to a security risk, privacy risk and trust in mobile payments, 2) to understand the differences between prospective adopters and persistent non-adopters related to a security risk, privacy risk and trust in mobile payments, 3) to segment adopters to identify the heterogeneous nature of the adopters and 4) to understand the differences related to a security risk, privacy risk and perceived trust within the adopter group.

LITERATURE REVIEW

Theoretical Development

Previous theories like the Technology Acceptance Model (TAM), The Unified Theory of Acceptance and Use of Technology (UTAUT), the Theory of Reasoned Actions (TRA), and Innovation Diffusion Theory (IDT) has given widely accepted by previous research as a theoretical lens and lays the foundation for acceptance of technology by users(Williams et al., 2015). Several technology diffusion models have been proposed to explain the factors influencing user intention to adopt new technology. In the diffusion of technology models, Rogers (1999) brought an essential breakthrough in the information system field. The theory of Reasoned Action (TRA) was the first generic theory to explain technology adoption. It proposed that the actual behaviour of individuals depends on the intention to use the technology and their attitude toward it (Ajzen and Fishbein, 1975, 2005; Madden et al., 1992). TRA was later extended to perceived behavioural control, which affects the actual behaviour

with behavioural intentions (Sheppard et al. 1988), which further became famous by the Theory of planned behaviour (TPB) by Ajzen (1991). Assessing the individual system use at the workplace using the TRA model, the Technology adoption model (Adams et al., 1992; Davis, 1993) added two more variables: perceived usefulness and perceived ease of use. Many researchers like Adam et al. (1992), Chin and Todd (1995), Taylor and Todd (1995), Venkatesh and Morris (2000), Elliott and Loebbecke (2000), Teo and Pok (2003), and Dissanayake et al. (2022) validated perceived usefulness and perceived ease of use as instrumental in explaining behavioural intention. The unified theory of acceptance and use of technology (UTAUT) was developed by Venkatesh et al. (2003), a unified model that unifies alternative views of user acceptance and innovation acceptance. The theory was developed by reviewing and integrating eight dominant theories and models, including the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model, the Theory of Planned Behavior (TPB), and a combination TBP/TAM, as well as the Model of Predictive Behavior (MPB). Several previous studies on technology adoption and diffusion in various disciplines of marketing, information system, social psychology, and management have extensively and effectively explored these theories and models.

Literature on Mobile Payments

Literature related to the pandemic's security, privacy, and trust concerns in vast domains, including finance, marketing, and banking, has not matured yet. Thus, a discussion on studies before the outbreak related to these concerns is necessary. Many studies have highlighted the effects of privacy, security, and trust on mobile payment settings. The use of mobile phones or other mobile devices to purchase goods or services is referred to as mobile payments (Kim et al., 2010). In this sense, mobile payments and mobile banking are two different aspects. Mobile banking includes a broader range of banking activities beyond mobile payments, such as chatbot conversations and loans requisition. However, privacy, security, and trust in mobile payments have been an emerging threat to the diffusion of mobile payments. In addition to providing valuable and user-friendly services, banks must establish a trusting relationship with their customers (Bashir & Madhavaiah, 2015). Perceived privacy risk, perceived security risk, and perceived trust have a salient influence on intention to accept mobile payment (Yang et al., 2015; Featherman et al., 2010; Loh et al., 2020; Hampshire, 2017).

According to Albashrawi (2017), customers tend to be less productive and less satisfied unless privacy concerns of mobile banking have been appropriately addressed. Privacy is considered as unwillingness to disclose personal information

(Gurung and Raja, 2016). Private information such as phone numbers, social security numbers, pin codes, consumption locations, and shopping records are required in mobile payments. Hence, there is a potential to violate privacy information by service providers such as intentionally collecting, disclosing, transmitting, or selling personal data without the consumers' knowledge or permission or hackers intercepting such information (Yang, 2015). Security refers to the "technical aspects that ensure the integrity, confidentiality, authentication, and non-recognition of transactions" (Flavia'n and Guinalı´u, 2006). The users feel insecure if the risk of exchanging personal information is higher (Balapour et al., 2019). Privacy consists of legal requirements and good practices in handling personal data.

On the other hand, security includes technical aspects that assure privacy issues are handled effectively (Matemba and Li, 2018). In this study, trust refers to "user beliefs in the trustworthiness of mobile payment" (Zhou, 2014). Technology trustworthiness is one factor that mainly reflects the reputation of e-commerce, and there is a positive relationship between trust and technological trustworthiness (Corbitt et al., 2003). Scarcity of user trust related to the security in online shopping was one issue faced by service providers in the early stages (Balapour et al., 2019). Similarly, consumers will not accept mobile payments if they perceive a lack of trust (Phonthanukitithaworn, 2016). Therefore, that is a predominant variable in establishing customer satisfaction with mobile payments (Hossain, 2019).

Extant literature shows some common similarities in trust, security, and privacy. These three aspects fall under the antecedents (Kesharwani and Bisht, 2012; Bashir and Madhavaiah, 2015; Chen, 2013; Gurung and Raja, 2016) and sub-dimensions (Thakur and Srivastava, 2014; Yang et al., 2015) of perceived risk. Risk perception, in return, impact these aspects (Malaquias and Hwang, 2016; Hossain, 2019). Furthermore, previous studies show interconnection among the dimensions. Perceived privacy risk influences the perceived security of the user (Balapour et al., 2019). In return, security significantly predicts privacy (Matemba and Li, 2018) and affects each other (Smith et al., 2011). Furthermore, there is a relationship between perceived security and perceived trust (Roca et al., 2009; Shin, 2010), where trust is a determinant of privacy (Belanger et al., 2002). Additionally, these are mooring factors that could impede or promote the switching intention to m-payment (Loh et al., 2020). Widyanto et al. (2021) have considered perceived security, perceived risk, and trust as privacy-related constructs. Nevertheless, the impact of three constructs has been examined separately in different contexts (Shin, 2010; Flavia'n and Guinalı´u, 2006; Roca et al., 2009; Hampshire, 2017). Therefore, even though the constructs represent similar virtues, three aspects are mutually exclusive (e.g. Smith et al., 2011). Following these works, the current study uses three aspects as individual factors.

Mobile Payment Landscape in Sri Lanka

For decades, Sri Lanka has been a cash-based economy, gradually transforming its payments landscape to card-based transactions and digital payments. SMS-based payments, W.A.P./GPRS-based payments, U.S.S.D. Payments, and then the latest form of mobile payments powered by mobile apps, are considered milestones of mobile banking evolution in Sri Lanka (Pathirana et al., 2018; Dandeniya, 2014). Initially, mobile banking applications are primarily limited to commercial bank customers, and lack of awareness stands as the major obstacle to expanding mobile money systems in Sri Lanka (Colombage, 2011). At the commencement of mobile money services, the Central Bank of Sri Lanka (C.B.S.L.) required all users to have a bank account. Afterwards, regulations were revised, enabling customers to use mobile money services without a bank account and providing the opportunity for mobile money service providers to enter the market (Gandhi and Vegesna, 2019).

Now, most Sri Lanka banks possess a mobile version of online/internet banking applications, and mobile payments occupy more than half of the mobile banking function. The extensive mobile phone penetration enhanced the potential to popularize mobile payments. The number of mobile connections in Sri Lanka has reached 149% of the population, and 10.1 million internet users will be available by 2020 (Kemp, 2020). There are 14 mobile phone-based payment service providers in Sri Lanka, including operators of customer account-based mobile payment systems (12) and operators of mobile phone-based e-money systems (2) (Central Bank of Sri Lanka, 2021). Q.R. payments displaced traditional P.O.S. terminals with the introduction of LankaQR. Currently, multiple digital wallets prevail in the market, such as Genie, eZy-cash, Fri, mCash, and Upay, to name a few. In collaboration with telecommunication providers, banks have taken initiatives to penetrate mobile payments to broader customer segments at the bottom of the pyramid, such as small-scale businesses like groceries, pharmacies, and street vendors via apps like SmartPay (Jayasinghe, 2020).

Nevertheless, Sri Lankan consumers are still loyal to using cash over other payments because of availability, efficiency, and the propensity to carry exact loose change (Senali et al., 2021). In line with this, mobile banking transactions remain far behind the volume of internet banking, A.T.M., debit cards, credit cards, and cheque transactions (Central Bank of Sri Lanka, 2021). However, the pandemic has fast-tracked the shift of people from this typical payment means to digital payments. During the pandemic, governments of higher middle-income countries like Sri Lanka also have taken steps to digital means of payments like the remote bank, opening e-wallet accounts, and remote financial services renewals (Mansour, 2021). Contrary to this, the digital payment preference of Sri Lankans is lower compared with other nations like China and Australia due to the lack of technical infrastructure (Senali

et al., 2021). However, according to Channa De Silva, C.E.O. of Lanka Clear, Sri Lanka's national payment infrastructure, plan ahead is to introduce smart messages for digital payments. With this feature, payment-related SMS from a bank or utility company contains a link directed to the customer's FinTech app with the information required to make the payment. It will further facilitate mobile payments in the future.

Research Hypotheses

Prior studies primarily investigated the impact of perceived risk, perceived security, perceived privacy, and trust on mobile payments (Widyanto et al., 2021) (Senali et al., 2021). Therefore, differences in these perceptions among banking clients were relatively understudied. In the current study, bank consumers who use mobile payments have been considered "adopters", and the banking customers who did not yet adopt mobile payments were named "non-adopters". Akinci et al. (2004) highlighted that the preference of banking delivery channels varies between internet banking users and non-users, where non-user groups are more loyal to the traditional channels like A.T.M.s and branches than users. According to Samsudeen et al. (2020) and Zhou (2014), customers' habits concerning technology affect the adoption of mobile payments, and users transfer their early trust in online payments towards initial trust towards mobile payments. Greater insecurity in mobile payment may occur among non-users and potential users without prior experience (Phonthanukitithaworn, 2016). According to Thakur and Srivastava (2014), mobile payment usage intention and determinants are significantly different among users and non-users. There are significant perceptual differences in perceived privacy and security risks between internet banking adopters and non-adopters (Ozdemir et al., 2008; Lee et al., 2005). Consumers' confidence in using electronic banking methods is different between the users and the non-users (Akinci et al., 2004) (Gerrard and Cunningham, 2003). Concerns about trust issues, including reliability, security, and privacy, differ between internet banking customers and non-internet banking customers (Rotchanakitumnuai and Speece, 2003). Therefore, we hypothesize that,

H_1: There is a significant difference in (a) perceived security risk, (b) perceived privacy risk, and (c) perceived trust between adopters and non-adopters of mobile payments.

Lee et al. (2005) argued that considering the population as homogeneous can be inaccurate and inappropriate if most of the population consists of non-adopters. Therefore, they categorize non-adopters as prospective adopters and persistent non-adopters. Prospective adopters; will immediately become adopters and persistent

non-adopters; those are likely to remain as non-adopters in the future. Moreover, they revealed the profound differences between prospective adopters and persistent non-adopters regarding risk perception. According to Ozdemir et al. (2008), internet banking non-adopters, or those who intend to use the service in the future (i.e. later adopters), has perceived the use of internet banking as less risky and more beneficial as compared to non-adopters, who do not intend to use the internet banking service (i.e. laggards). Therefore, we hypothesize that,

H_2: There is a significant difference in (a) perceived security risk, (b) perceived privacy risk, and (c) perceived trust between prospective adopters and persistent non-adopters of mobile payments.

Previous studies have been widely used various mobile banking antecedents for the segmentation of adopters (Chawla and Joshi, 2021; Mann and Sahni, 2012). Nevertheless, the current study employed the degree of mobile payment services availed by adopters for the segmentation process to identify the dichotomy of perceptions (Chawla and Joshi, 2021). In the Sri Lankan context, mobile payment usage behaviour is sixfold: paying utility bills, institutional payments, fund transfers, purchasing the product over the counter, internet transactions, and others (Central Bank of Sri Lanka, 2021). The perception of trust, privacy, and security varies among different consumer segments of internet banking (Mann and Sahni, 2012). Therefore, we hypothesize that,

H_3: There is a significant difference in (a) perceived security risk, (b) perceived privacy risk and perceived trust among the adopters of mobile payments.

METHODOLOGY

Data Collection and Sample Description

Considering that mobile payment adoption is higher among the educated community, the study's target population was defined as the undergraduates of a university, Sabaragamuwa University of Sri Lanka. An online questionnaire was developed using Google forms to collect the primary data as the researchers used an international existing model to evaluate phenomenon in Sri Lanka (Dewasiri et al, 2018a; Dewasiri et al., 2018b). The google form was circulated online as the web link via a social media platform (WhatsApp) among the undergraduates of different faculties. The study's questionnaire has two parts; the first part is concerned with the respondents' demographic details. The second part contains items of theoretical constructs

regarding trust, privacy, and security concerns of mobile-based payment as indicated in the appendix 1. Before the items, in second, the definition for mobile payment was included. The scale to measure every construct was adapted from the previous literature with minor modifications to suit the pandemic context. Perceived privacy risk was measured using four items like "I think mobile payment service providers endanger my privacy by using my personal information without my permission", and the perceived security risk was measured using four items like "I fear that the list of P.I.N. codes may be lost and end up in the wrong hands". Perceived trust was also assessed using four items. For example, "I believe that m- payment always provides reliable financial services". The responses for each question were measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The data of 267 respondents was collected with over 85% of response rate through convenient sampling. Nevertheless, after removing the incomplete and incorrect responses, 215 were usable for the analysis. We used independent sample t-tests and One –Way Anova in investigating the phenomenon as we used scales such as dichotomous and a six point scaleas dependent variables.

Analysis and Interpretation of Results

The majority of respondents were female (66 per cent), aged 24-27 (75.4 per cent), and with a commerce background (45.1 per cent). 162 respondents (75.3 per cent) indicated themselves as mobile payment adopters, which were very high, compared to the average proportions of mobile payment using customers of the Sri Lankan banks; this may be due to the selection of undergraduates as the sample, which represents the educated community of the country. The results revealed that the majority of mobile banking users were female (61.1 per cent), concerning age; the largest user group (74.6 per cent) was at the age of 24-27 with a commerce background (51.2 per cent) (Table 1). Out of 53 non-adopters, 17 (7.9 per cent) were persistent non-adopters, and 36 (16.7 per cent) were prospective adopters. Table 1 indicates that the non-adopter category broadly represents females (81.1 per cent) at 24-27 age (37.7 per cent) with an engineering background (60.4 per cent)

Respondents possess higher perceived trust (M=3.304), followed by perceived security risk (M=2.900) and perceived privacy risk (M=2.874). Accordingly, mobile payment users' and non-users trust is higher than the risk perception. Finally, we assess the individual variables' normality condition using skewness and kurtosis. The values were within +1 and -1 (Table 2), indicating the data adhered to the normality condition (Darren and Mallery, 2011).

The reliability of the items was assessed using the Cronbach alpha, and all the values were well above 0.7, which is acceptable. In addition, the validity of the constructs was confirmed using K.M.O. and B.T.S. tests. All the K.M.O. values are over 0.5, and B.T.S. values are below 0.05, which are acceptable (Table 3).

Table 1. Demographics of respondents

Variable		All Respondents (215)		Adopters (162)		Non-adopters (53)	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender	Male	73	34.0	63	38.9	10	18.9
	Female	142	66.0	99	61.1	43	81.1
Age	21-23	44	20.4	32	19.8	12	22.7
	24-27	162	75.4	121	74.6	41	77.3
	28-30	9	4.2	9	5.6	0	0
Education	Commerce	97	45.1	83	51.2	14	26.4
	Science	11	5.1	9	5.6	2	3.8
	Engineering	80	37.2	48	29.6	32	60.4
	Art	21	9.8	17	10.5	4	7.5
	Others	6	2.8	5	3.1	1	1.9

Table 2. Descriptive statistics

Variable	n	Mean	SD	Skewness	Kurtosis
Perceived Privacy Risk	215	2.874	0.758	0.075	-0.088
Perceived Security Risk	215	2.900	0.844	-0.109	-0.328
Perceived Trust	215	3.304	0.738	0.351	-0.013

Table 3. Item reliability and validity

Variable	No of Items	Conbrach's Alpha	KMO	BTS
Perceived Privacy Risk	4	0.721	0.740	0.000
Perceived Security Risk	4	0.755	0.758	0.000
Perceived Trust	4	0.746	0.717	0.000

The differences of perceptions between adopters and non-adopters were tested using an independent sample t-test. The adopters and non-adopters were classified using a statement in the questionnaire asking whether the respondents use mobile payments or not. Independent sample t-test results show that non–adopters have higher perceived privacy risk (M=3.024, SD=0.666), perceived security risk (M=2.976, SD=0.765), and lesser perceived trust (M=2.901, SD=.540) rather than the adopters (Table 4). Further this differences were only significant for perceived trust between adopters and non-adopters $t(213) = -4.806$, $p > 0.05$ (Table 5). Therefore, H_1 was partially supported.

Table 4. Group statistics- adopters and non-adopters

Variable	Category	N	Mean	Std. Deviation	Std. Error Mean
Perceived Privacy Risk	Non-adopters	53	3.024	0.666	0.091
	Adopters	162	2.826	0.782	0.061
Perceived Security Risk	Non-adopters	53	2.976	0.765	0.105
	Adopters	162	2.875	0.869	0.068
Perceived Trust	Non-adopters	53	2.901	0.540	0.074
	Adopters	162	3.435	0.747	0.059

Table 5. Independent samples test for the adopters and non-adopters

Variable	Variance Assumption	Levene's Test for Equality of Variances		t-Test for Equality of Means	
		F	Sig.	Sig. (2-Tailed)	Mean Difference
Perceived Privacy Risk	Equal variances assumed	2.318	0.129	0.099*	0.198
	Equal variances not assumed			0.075*	0.198
Perceived Security Risk	Equal variances assumed	0.524	0.470	0.449	0.101
	Equal variances not assumed			0.420	0.101
Perceived Trust	Equal variances assumed	8.617	0.004***	0.000***	-0.534
	Equal variances not assumed			0.000***	-0.534

From 215 usable responses, 24.7% (53) were non-adopters. segment the non-user category, the future intentions of the respondents were examined. Respondents who hold the intention to become adopters immediately are named as prospective adopters, and those who hold an intention to remain as non-adopters in the next 12 months period are named as persistent non-adopters (Lee et al., 2005). Out of the non- adopter group, 67.9% (36) were prospective adopters, and 32.1% (17) were persistent non-adopters. Further, the number of cases in each class was not equal, and the persistent non-adopter segment consisted of below 30 respondents. Therefore, the robust bootstrap method was used to compare means. Bootstrapping is one of the robust ways to test mean differences (Field, 2009). In case the sample size in each group is unequal, and below 30, the bias-corrected and accelerated (BCa) method of bootstrap is used (Chen and Peng, 2014). Moreover, it is recommended to use 2,000 bootstrap samples (Field and Wilcox, 2017). These recommendations were followed to analyze the dichotomy of the non-adopter category.

Table 6. Group statistics –non-adopters

Variable	Non- adopter Category	Measure	Statistic	Bootstrap			
				Bias	Std. Error	BCa 95% Confidence Interval	
						Lower	Upper
Perceived Privacy Risk	Prospective adopters	Mean	2.986	-0.001	0.096	2.800	3.177
		Std. Deviation	0.591	-0.014	0.078	0.451	0.702
		Std. Error Mean	0.099				
	Persistent non-adopters	Mean	3.103	.004	0.198	2.711	3.529
		Std. Deviation	0.815	-0.032	0.126	0.609	0.959
		Std. Error Mean	0.198				
Perceived Security Risk	Prospective adopters	Mean	2.958	-0.004	0.126	2.691	3.188
		Std. Deviation	0.745	-0.017	0.078	0.608	0.850
		Std. Error Mean	0.124				
	Persistent non-adopters	Mean	3.015	-0.001	0.194	2.637	3.378
		Std. Deviation	0.827	-0.029	0.092	0.678	0.915
		Std. Error Mean	0.200				
Perceived Trust	Prospective adopters	Mean	2.889	0.000	0.090	2.709	3.060
		Std. Deviation	0.539	-0.014	0.079	0.397	0.653
		Std. Error Mean	.0899				
	Persistent non-adopters	Mean	2.927	-0.001	0.134	2.658	3.191
		Std. Deviation	0.557	-0.025	0.087	.406	0.648
		Std. Error Mean	0.135				

a. Unless otherwise noted, bootstrap results are based on 2000 bootstrap samples

As per the mean values, prospective adopters have lower perceived privacy risk (M=2.986, SD=0.591), security risk (M=2.958, SD=0.745), and perceived trust (M=2.889, SD=0.539) compared with the persistent non-adopters (Table 6). However, none of these differences between prospective adopters and persistent non-adopters were significant where perceived privacy risk t (51) = -0.593, $p > 0.05$, security risk t (51)= -0.248, $p > 0.05$, and perceived trust t(51)= -0.234, $p > 0.05$ (Table 7).

These results were further confirmed by a robust estimate of 95% class intervals (CI) by the B.C.A. method of bootstrap. The bootstrapped CI for perceived privacy risk (lower bound = -0.538 and upper bound = 0.284), perceived security risk (lower bound = -0.516 and upper bound = 0.384) and perceived trust (lower bound = -0.353 and upper bound = 0.285) include zero indicating the differences were indeed not significant (Table 8). Therefore, H_2 was not supported.

Table 7. Independent samples test –non-adopters

Variable	Variance Assumption	Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-Tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Perceived Privacy Risk	Equal variances assumed	2.329	0.133	-0.593	51	0.556	-0.117	0.197	-0.513	0.279
	Equal variances not assumed			-0.529	24.258	0.602	-0.117	0.221	-0.573	0.339
Perceived Security Risk	Equal variances assumed	1.128	0.293	-0.248	51	0.805	-0.056	0.227	-0.512	0.400
	Equal variances not assumed			-0.239	28.704	0.813	-0.056	0.236	-0.539	0.426
Perceived Trust	Equal variances assumed	0.057	0.813	-0.234	51	0.816	-0.038	0.160	-0.360	0.284
	Equal variances not assumed			-0.232	30.547	0.818	-0.038	0.162	-0.369	0.294

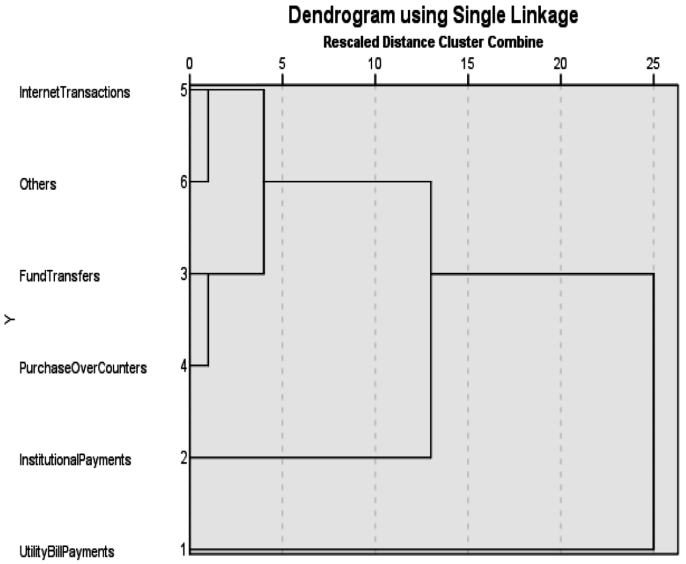
Table 8. Bootstrap for independent samples test

Variable	Variance Assumption	Mean Difference	Bootstrap			
			Bias	Std. Error	BCa 95% Confidence Interval	
					Lower	Upper
Perceived Privacy Risk	Equal variances assumed	-0.117	-0.005	0.219	-0.538	0.284
	Equal variances not assumed	-0.117	-0.005	0.219	-0.538	0.284
Perceived Security Risk	Equal variances assumed	-0.056	-0.003	0.232	-0.516	0.384
	Equal variances not assumed	-0.056	-0.003	0.232	-0.516	0.384
Perceived Trust	Equal variances assumed	-0.038	0.002	0.160	-0.353	0.285
	Equal variances not assumed	-0.038	0.002	0.160	-0.353	0.285

a. Unless otherwise noted, bootstrap results are based on 2000 bootstrap samples

The large majority of our sample consists of adopters (75.3 per cent). Therefore, the adopter group's segmentation was carried out to achieve the third objective. To segment the adopter group, the usage behaviour of the adopters was used. Respondents were asked to mention the functions for which they use mobile payments. In the initial questionnaire, respondents have selected their uses out of the given six uses. Based on these six uses heterogeneous nature of the adopters were identified. First hierarchical cluster analysis was carried out to gain an insight into the number of clusters. Then, hierarchical cluster analysis was performed using the single linkage method. According to the Dendrogram, mobile payment users can be segmented into two categories based on their usage behaviour. The first segment is adopters who are limited only to utility payments. The second segment of adopters is adopted for a wide range of uses like internet transactions, fund transfers, purchase over counters, paying institutional payments, and others (Figure 1).

Figure 1. Dendrogram



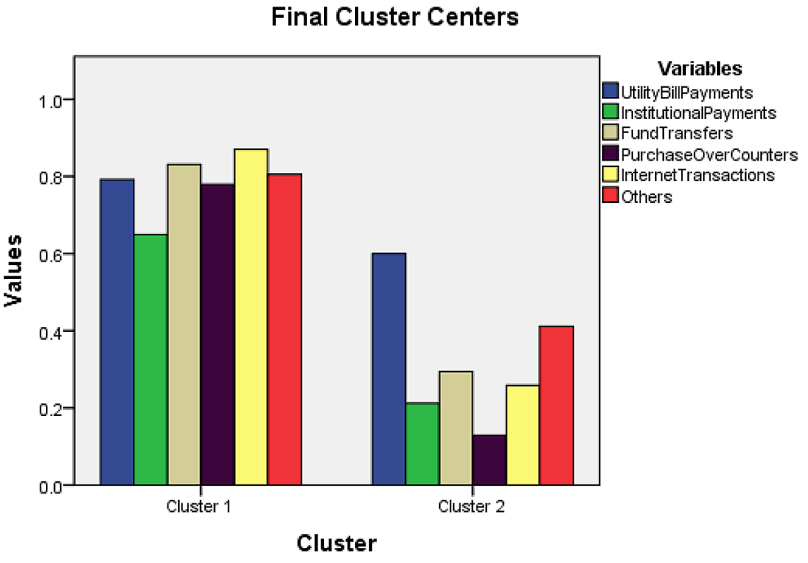
Then, we segmented the adopters into two clusters using k-means cluster analysis to compare the differences. K-means cluster analysis was carried out using the average scores of various uses. The principle behind the formation of various groups is the concept of squared Euclidean distance (Chawla and Sondhi, 2016). The identified clusters were appropriately labelled based on the final cluster centres. The cluster with above 0.5 cluster centre was named "Advanced users", which is highly

involved in many aspects of mobile payments (Figure 2). The cluster with cluster centres lower than 0.5 was named "Laggards" (Figure 2). This customer segment is particularly limited to one or a few mobile payment aspects. The first and second clusters have 77 and 85 responses, respectively (Table 10). It can be seen that cluster 1 scores are higher on all six dimensions while cluster 2 scores remain less (Figure 2). Moreover, the average scores for all six dimensions are significantly different among the two clusters.

Table 9. One-way ANOVA results

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Utility Bill Payments	1.493	1	.207	160	7.220	.008
Institutional Payments	7.736	1	.198	160	39.021	.000
Fund Transfers	11.653	1	.178	160	65.528	.000
Purchase OTC	17.059	1	.143	160	119.594	.000
Internet Transactions	15.098	1	.156	160	96.598	.000
Others	6.254	1	.204	160	30.630	.000

Figure 2. K-means cluster analysis



Advanced users have lower perceived privacy risk (M=2.773, SD=0.760), security risk (M=2.838, SD=0.914) and higher perceived trust (M=3.500, SD=0.708) compared with the laggards (Table 10).

Table 10. Group statistics-adopters

Variable	Cluster Number of Case	N	Mean	Std. Deviation	Std. Error Mean
Perceived Privacy Risk	Advanced users	77	2.773	0.760	0.087
	Laggards	85	2.874	0.802	0.086
Perceived Security Risk	Advanced users	77	2.838	0.914	0.104
	Laggards	85	2.909	0.831	0.090
Perceived Trust	Advanced users	77	3.500	0.708	0.080
	Laggards	85	3.377	0.781	0.085

Table 11. Independent samples test- adapters

Variable	Variance Assumption	Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-Tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Perceived Privacy Risk	EVA	0.285	0.594	-0.819	160	0.414	-0.101	0.123	-0.344	0.142
	EVNA			-0.821	159.673	0.413	-0.101	0.122	-0.343	0.142
Perceived Security Risk	EVA	0.876	0.351	-0.519	160	0.604	-0.071	0.137	-0.342	0.200
	EVNA			-0.517	154.200	0.606	-0.071	0.138	-0.343	0.201
Perceived Trust	EVA	0.353	0.553	1.051	160	0.295	0.123	0.118	-0.109	0.356
	EVNA			1.056	159.999	0.293	0.123	0.117	-0.108	0.355

Note: EVA - Equal variances assumed / EVNA - Equal variances not assumed

To check the differences between the advanced user group and laggards independent sample t-test was employed. The results show that all the differences between advanced users and laggards were not significant where perceived privacy risk $t(160) = -0.819$, $p > 0.05$, security risk $t(160) = -0.519$, $p > 0.05$, and perceived trust $t(160) = 1.051$, $p > 0.05$ (table 11). Therefore, H_3 was rejected.

CONCLUSION

The covid-19 pandemic has created a shift from cash to mobile payment worldwide. Following this, mobile payment adoption in Sri Lanka has mainly been accelerated. Nevertheless, the enormous rise of cybercrimes was also reported at the same period. In this background, we attempted to capture the dichotomous risk perceptions (privacy, security, and trust) of mobile payment users and non-users. Furthermore, we segment the non-adopter category as prospective adopters and persistent non-adopters. Adopters were categorized as advanced users and laggards to capture the differences in risk perception within the subgroups. The adopters have higher perceived trust in mobile payments than non-adopters, and the difference was significant. Therefore, the non-adopters bear higher risk perceptions when compared with adopters. It is in line with the findings of Cham et al. (2022) and they identified perceived complexity, perceived incompatibility and perceived cost as bariiers for non-adopters

Nevertheless, these differences were not statistically significant. There is no difference in risk perceptions prevailing within the adopter and non-adopter segments. Therefore, our findings are not consistent with Ozdemir et al. (2008) and Lee et al. (2005) but are in line with the findings of Rotchanakitumnuai and Speece (2003). These works are carried out in a similar domain; internet banking and different country contexts. Thus, our results are encouraged scholars to support this debate regarding the perceptual differences related to the risk and trust among various customer segments in different contexts. Hierarchical cluster analysis results reveal that mobile adopters are twofold according to the usage behaviour; individuals who are limited to utility payments and individuals with comprehensive usage behaviour. Furthermore, utilizing k-means cluster analysis, we identify two categories of mobile payment users; Advanced Users who are adopters of extensive usage of mobile payments and Laggards who are limited to one or a few uses. These results are also in line with some of Chawla and Joshi (2021) results and contradict some results of the same study since they have classified customers into three segments.

This study uses convenient sampling. Accordingly, respondents from educated communities (undergraduates) were used. Comparatively less educated respondents

were not included in the study. Therefore, this study does not represent the whole mobile payment adopter segment in the market. Consequently, we recommend a survey including less educated customer groups in the future. A study that examines customer groups' differences using demographic variables like age, income, education background, and gender is also applicable.

Managerial Implications

The study has several managerial implications for the banking industry. First, this research focuses on highly educated customer groups. Therefore, understanding the perception of the educated customer segment is worthy since the large majority of the mobile payment users are educated, young people. Secondly, this study proves that there is still a non-adopter segment that prevails within the market, and the pandemic was unable to shift their intention for mobile payments. Nevertheless, most non-adopters hold a prospection for the adoption in the recent future. Therefore, banks can still design marketing campaigns to grab this customer segment. Thirdly, the adopter group consists of the utility bill payer segment and comprehensive user segment. Therefore, banking institutions and managers should focus their attention on the causes of the reluctance to use other services and shift utility payers to other usages like fund transfers, internet transactions, and others.

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APPENDIX

Table 12.

Perceived Privacy (Thakur and Srivastava, 2014)	
PP1	I think mobile payment service providers could provide my personal information to other companies without my consent
PP2	I think subscribing to mobile payment services increases the likelihood of receiving spam/ spam SMS
PP3	I think mobile payment service providers endanger my privacy by using my personal information without my permission
PP4	I think mobile payment service providers will send SMS advertisements without the user's consent.
Perceived Security (Thakur and Srivastava, 2014)	
PS1	I fear that while I am paying a bill by mobile phone, I might make mistakes since the correctness of the inputted information is difficult to check from the screen.
PS2	I fear that while I am using mobile payment services, the battery of the mobile phone will run out, or the connection will otherwise be lost.
PS3	I fear that while I am using a mobile payment service, I might tap out the information of the bill wrongly.
PS4	I fear that the list of P.I.N. codes may be lost and end up in the wrong hands.
Perceived Trust (Phonthanukitithaworn et al., 2016) and (Zhou, 2014)	
PT1	I believe that m-payment parties are honest
PT2	I believe that m-payment parties will not take advantage of me
PT3	I believe that m- payment always provides accurate financial services.
PT4	I believe that m- payment always provides reliable financial services.

Chapter 6
Organizational Changes and Leadership Suitability:
A Study of Institutional Diversity in Educational Institutions

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ABSTRACT

Implementing diversity agendas at dispersed, loosely connected, and change-resistant institutions such as colleges and universities is a global concern. To create the essential transformation for a diversity agenda to thrive, a shift in the organizational environment and culture is required. Higher education experts have long recognised leadership styles as one of the most essential contributing aspects to successful institutional transformation and specifically during technological time (IoT), particularly when it comes to diversity agenda initiatives. This chapter reviews the literature on various types of diversity agendas, change paradigms due to change in technology, and leadership styles by synthesising data from 10 case studies on successful strategies and providing implications for how diverse leadership styles might be employed to fuel the institutional diversity effort.

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INTRODUCTION

Colleges and universities are not immune to the continual challenges of technological transformation and advantages of fostering social diversity, fairness, and inclusion ideals as organisations embedded in a larger society.

The promotion of these ideas in higher education has not been without controversy, and institutions will continue to face significant internal and external challenges in their efforts to incorporate diversity into their organizational structures and cultures (Aguirre and Martinez, 2006; Williams, 2013). As a result, academics and practitioners have joined forces to argue that higher education must change to reflect shifting demographic patterns, educate students for a more globalised economy and varied workforce, and embrace the principles of social and cultural pluralism and equity (Aguirre and Martinez, 2006; Chun and Evans, 2009; Williams, 2013).

To Describe These Values, the Term "Diversity Agenda" Was Coined

This research was based on three different lines of inquiry, which are addressed further below.

The relevant literature on institutional diversity strategies, sometimes known as the diversity agenda, is examined first. Following that, an overview to change technological paradigms implicated in the diversity agenda scholarship, namely co-optative and transformative change, is provided. Finally, the notion of leadership is examined, with a focus on three key leadership style paradigms: transactional, transformational, and full range leadership. As previously said, the three key areas of Williams, are social justice rationale, educational benefits rationale, and business reason (2013). The necessity for higher education institutions to adapt to shifting demographic trends, technological transformation due to IoT and address both historical and contemporary identity-based societal injustices is referred to as the social justice justification.

The case for educational advantages is based on research findings that highlight the importance of attracting and retaining students from a diverse background to educational and human development purposes.

The commercial motive refers to the need for institutions to become more inclusive to compete for top students, teachers, and staff, as well as to prepare students for a global economy and a diverse workforce in the era of technological transformation due to IoT (Williams, 2013). As a result of these problems and opportunities, diversity is becoming a strategic goal for schools and universities (Williams, 2013).

Several organisations have produced institutional policy statements, often known as diversity agendas, as a way of demonstrating commitment and structuring their

diversity-related actions (Anderson, 2008; Iverson, 2007, 2008; Kezar and Eckel, 2008; Kezar, Eckel et al., 2008; Williams, 2013).

The term "diversity agenda" is sometimes misleading. According to the paper, 'there is no agreement among institutional types on a format for a campus diversity plan' (Anderson, 2008, p. 38). According to Kezar and Eckel (2008, p. 401), some colleges refer to the diversity agenda as covering "efforts to transform the campus to be more inclusive," and "[a] diversity agenda" signifies "efforts to modify the campus and "[a] diversity agenda" signifies "efforts to modify the campus to be more inclusive."

Other researchers (Anderson, 2008; Iverson, 2007, 2008; Williams, 2013) provided a more detailed description of the elements of a diversity agenda. According to Iverson (2008, p. 183) who defined a diversity agenda as

policy documents [that] constitute a fundamental vehicle by which colleges push proposals regarding their purported or initiative is multifaceted and attempts to integrate diversity into the structure, culture, and fabric of the institution so that it is truly institutionalised, and [a] diversity agenda or initiative is multifaceted and attempts to integrate diversity into the structure, culture, and fabric of the institution so that it is truly institutionalised.

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policy documents [that] constitute a fundamental vehicle by which colleges push proposals regarding their purported commitment to equal access and an inclusive environment for all members of the campus community, diversity agendas (or action plans) are policy documents [that] constitute a fundamental vehicle by which colleges push proposals regarding their purported commitment to equal access and an inclusive environment for all members of the campus community.

According to Iverson, diversity agendas (or action plans) are "policy documents that serve as a basic vehicle via which universities advance initiatives related to their professed commitment to equitable access and an inclusive environment for all members of the campus community" (2008, p. 183).

Diversity plans are defined by Williams (2013, p. 303) as "any purposefully designed document that includes a diversity definition, reasons, goals, planned activities, assignments of duty, timetables, accountability mechanisms, and a budget." Diversity agendas should serve as a plan of action, a guide for members of a campus community and leaders entrusted with putting its recommendations

into action, regardless of their name or degree of clarity. According to the research, policy guidelines are "a critical mechanism through which institutions make recommendations regarding their stated commitment to fair access and an inclusive environment for all members of the campus community."

Diversity agendas should serve as a guide for members of a campus community and leaders tasked with implementing its recommendations for change, regardless of their name or degree of specificity (Williams, 2013), and, more importantly, as a signal of an institution's desire to change its culture to become an inclusive organisation (Williams, 2013; Aguirre and Martinez, 2006).

Despite their symbolic value as institutional policy and strategy objects, diversity agendas have a high failure rate (Williams et al., 2005).

Williams, Berger, and McClendon (2005) identify two related concerns as grounds for failure: their low success rates in changing business culture and their lack of, weak, or insufficient college leadership. We'll look at how change paradigms are applied to diversity agendas and leadership styles in the next part, as well as how they relate to organizational transformation.

Paradigms of Change

Depending on the degree to which it occurs, organizational change is classed as first-order or second-order.

According to first-order change theory, 'little adjustments and modifications that do not affect the system's core and occur as the system grows and develops naturally' (Levy and Merry, 1986, p. 5). Second-order change is defined as a significant change in an organization's "underlying values or mission, culture, functional procedures, and structure" (Kezar, 2011, p. 16). Scholars have identified co-optative and transformational change as two types of change paradigms employed by postsecondary institutions to address diversity, referring to them as "competing organizational techniques" (Aguirre and Martinez, 2006, p. 48).

Co-optative change strategies relate to efforts to "[absorb] new elements into an organization's leadership or policy-making structure as a strategy of averting risks to its stability or existence" (Selznick, 1948, p. 34).

According to Aguirre and Martinez (2006, p. 56), "actions to address prejudice and social justice issues related to diversity" are referred to as "co-optation."

Co-optative change is sometimes defined as a rational-bureaucratic, managerial approach to low-level change (Aguirre and Martinez, 2006). Because it "use[s] diversity dimensions in the organizational culture – minority faculty, multiculturalism in the curriculum, and role models for minority students – as buffers to maintain organizational culture," co-optation works against the goals of the diversity agenda (Aguirre and Martinez, 2006, p. 56). Tactics aimed at creating deeper cultural

change, on the other hand, were labelled as transformational change by Aguirre and Martinez (2006).

As a result of their half-decade long study on transformation, Eckel and Kezar (2003, p. 27) defined transformational change as "affecting institutional cultures, as deep and broad, as intentional, and as unfolding over time."

Transformational approaches to organizational change are deliberate, second-order responses to external events aimed at influencing corporate culture "without completely rebuilding the organisation" (Aguirre and Martinez, 2006, p. 56). In the context of diversity agendas, transformational change aims to incorporate social justice and multiculturalism into the organization's fabric, including its culture (Aguirre and Martinez, 2002, 2006; Williams, 2013).

Transformational change, according to organizational change scientists, is difficult to achieve and maintain, in part due to the complexity of organisations.

There are few effective examples of revolutionary change in higher education, and those that do have fallen short of expectations (Kezar, 2011). Transformational change, particularly diversity-related transformational change, is conceivable (Kezar and Eckel, 2008; Williams 2013). Leaders must set a shared vision for the company's future as well as offer the necessary structures and processes for people to participate in learning.

(Kezar, 2005; Eckel and Kezar, 2003). In order to realise the diversity agenda's core goals, higher education institutions must undergo transformational change, with organizational culture as the transformative focus (Aguirre and Martinez, 2002, 2006; Williams, 2013).

According to experts, Cultural Revolution is taking place, according to academics, necessitates strong leadership (Kezar, 2011).

LEADERSHIP STYLES

There is no universal agreement on what constitutes "the ideal leadership style" (Bolman and Deal, 2017). According to some experts (e.g., Aguirre and Martinez, 2006), transformational leadership approaches are particularly effective when it comes to the corporate culture overhaul needed by diversity targets in higher education. Presidents report using a variety of leadership styles (transformational, transactional, and laissez-faire – or. full-range leadership) to carry out diversity agendas, according to other research scholars (Kezar and Eckel, 2008).

Transformational change, according to organizational change scientists, is difficult to achieve and maintain, in part due to the complexity of organisations. There are only a few successful examples. Others have said that outstanding diverse leaders can use a variety of leadership styles, such as Bolman and Deal's (2017) structural,

political, and symbolic leadership frames, as well as Birnbaum and Edelson's (1989) collegial leadership frame (Williams, 2013; Williams and Wade-Golden, 2013).

On the scale of leadership styles, we study and identify the characteristics of other types that sit between the bookend standards of 'transactional leadership' and 'transformational leadership' in this review. Bensimon, Neumann, and Birnbaum (1989, p. 10) define transactional leadership as a "relationship between leaders and followers based on an exchange of valued goods, which could be economic, political, or psychological in nature."

Transactional leaders cultivate trust and honesty in their relationships in order to maintain the organization's structure and culture (Bensimon et al. 1989). In order to maintain the status quo, transactional leaders frequently act reciprocally with their subordinates. According to Bensimon and colleagues (1989), transactional leadership is most typically used by college and university administrators since it focuses on maintaining organizational cultures. They suggest that a transactional style works better in higher education, because leadership is more diffuse and values are more likely to be localised rather than broad and organizational-wide (Bensimon et al., 1989). Furthermore, this leadership style best exemplifies how 'college and university presidents can collect and wield authority by restricting access to information, overseeing the financial process, allocating resources to specific initiatives, and reviewing critical faculty and administrative appointments' (Bensimon et al., 1989, p. 39). Bass (1990, p. 21) concluded that this exchange-based style of leadership is 'ineffective and, in the long run, may be counterproductive,' and that the efficacy of a transactional style of leadership is determined by a leader's access and ability to distribute rewards, as well as 'whether the employees want the rewards or fear the penalties,' based on private sector research.

The power to alter things for the better is what transformational leadership is all about. The diversity agenda needs large-scale, long-term organizational and cultural changes, and transformational leadership has been viewed as having the greatest potential for achieving these goals (Aguirre and Martinez, 2002, 2006). The transformative style, according to Christman and McClellan (2008, p. 20), is moral leadership that "raises the standard of human conduct and ethical desire of both leader and led, and thus it has a transforming effect on both'.

Successful transformational leaders act as instructors and moral guides, and 'understand [organizational] culture and use symbols' as a method of achieving organizational change (Tierney 1989, p. 160). Transformational leaders employ the following strategies: (a) idealised influence (leading by example); (b) inspirational motivation (inspiring commitment by challenging subordinates, providing meaning to their work, and outlining an appealing vision of the future); (c) intellectual stimulation (inspiring and supporting creative thinking and problem solving);

and (d) individualised consideration (leaders provide coaching and mentoring to subordinates in order to help them reach their full potential) (Bass and Riggio, 2006). Transformational leadership, according to Christman and McClellan (2008, p. 20), is moral leadership that "raises both the leader's and the led's degree of human conduct and ethical desire, and so has a transforming influence on both." Indeed, researchers have revealed that a full-range leadership style, which combines transformational and transactional leadership styles, is both effective and most likely to be adopted by higher education executive.

Full-spectrum Leadership

Transactional and transformational leadership are on opposite extremities of the power and influence leadership spectrum, with a full-range leadership style in the middle. Bernard Bass is credited with creating full range leadership by combining the 'charismatic-transforming-leadership style' and the 'bureaucratic-transactional-management method' (Antonakis and House 2002, p. 7). Both transformational and transactional leadership styles are combined in full-range leadership.

Frames of Authority

Bolman and Deal (2017) propose four frame theories of organisations and leadership: (a) structural frame – the use, coordination, and control of formal organizational structures and hierarchies as a means of advancing organizational priorities and achieving organizational goals; (b) human resource frame – organizational functioning, efficacy, and success as contingent on meeting the needs and appealing to the interests of its members; and (c) political frame – the use, coordination, and control of political structures and hierarchies as a means of advancing organizational symbolism. The loosely connected type of organisation that characterises colleges and universities (Weick, 1976), where authority is shared through various academic units and shared governance structures, is ideal for both Birnbaum and Edelson's (1989) collegial frame and Bolman and Deal's (2017) four-frame theory.

Collegial leaders use the institution's existing shared governance procedures and adhere to academe and institution culture norms to reach consensus across organizational power groups and stakeholders (Birnbaum and Edelson, 1989). We conceived of the structural and political frames as representative of the transactional, and the human resources, symbolic, and collegial frames as representative of the transformational, by aligning the various frames of Bolman and Deal's (2017) theory and Birnbaum and Edelson's (1989) collegial frame with broader transformational and transactional leadership style paradigms.

Hierarchical hierarchies, strategic planning, and the use of incentives, rewards, and punishments as leadership tools are all emphasised in the transactional leadership paradigm and structural and political frames.

Leaders must appeal to their followers' sense of morality, maintain and exhibit a high moral standard, communicate a strong organizational vision, and engage, empower, and inspire their followers, according to the human resources, symbolic, and collegial frames, as well as the transformational leadership paradigm. The dimensions of the institution's issues (Bensimon, 1993), their social identities (Kezar and Eckel, 2008), their location within the organisation (Brown and Moshavi, 2002), and organizational culture (Kezar et al., 2006), among other things.

As we've seen, higher education researchers and practitioners believe that transformational change, not co-optative change, is the most effective technique for advancing an institutional diversity agenda. It's less clear, however, which leadership style is appropriate for guiding these diversity-focused transformation agendas.

The following study question guided our literature review: which leadership style is better for executing the diversity agenda in higher education institutions?

METHODS

Our goal is to "summarise the current state of knowledge on the relationship(s) of interest and to highlight critical difficulties that research has left unsolved" in order to "identify the best leadership style(s) for executing the diversity agenda in colleges and universities" (Cooper 1982, p. 292). A four-step method guided our evaluation of the scholarly literature.

To help guide our theoretical understanding and search method, the authors first read three basic monographs: Diversity Leadership in Higher Education by Aguirre and Martinez (2006), Strategic Diversity Leadership: Activating Change and Transformation in Higher Education by Williams (2013), and The Chief Diversity Officer: Strategy, Structure, and Change Management by Williams and Wade-Golden (2013).

We identified organizational and cultural transformation as important issues as a result of our reading, which we utilised to steer our further search for scholarly literature. After that, we carried out a thorough search of five research databases. We found a total of 224 sources during our search. Finally, each of the 224 sources was scrutinised to determine if it was related to the research topic. Almost all of the manuscripts were considered unrelated to the research subject, with the exception of three. In the fourth and final stage, an ancestry technique was utilised to find additional sources cited in both the foundational texts and those obtained through database searches.

Procedure for Looking for Information

We used the theoretical principles highlighted in our reading of the three main books to perform a comprehensive search of five electronic scholarly research databases: (a) Academic Search Premier; (b) ERIC; (c) Education Research Complete; (d) Education Full Text; and (e) JSTOR.

We conducted two searches in each database using Boolean search techniques, limiting our search to peer-reviewed papers and using the terms (a) organizational transformation OR culture change and leadership and diversity and higher education; and (b) leadership and diversity and higher education.

Each database record was imported into Zotero, an open-source citation management programme that gathered bibliographic metadata as well as, when available, the abstract for each article. After deleting duplicates, this step yielded 224 total results. After that, the abstracts of each result were checked, and 112 papers were deemed to be relevant. Only six manuscripts were reviewed out of 112 to examine if leadership played a role in promoting diversity on college campuses. The majority of the irrelevant texts implicated leadership only insofar as individual leaders were involved in the design or implementation of diversity efforts and initiatives but did not adequately discuss the manner and degree of leadership involvement, and thus were deemed irrelevant to this investigation. The fourth and last step was to conduct an ancestry search (Cooper, 1982). The ancestry approach could be used by researchers to locate previously indicated sources that have been overlooked.

Another text was identified using this method.

Procedure for Analysis

The criterion for inclusion in our analysis were met by a total of 8 papers, as well as the technique of discovery. To achieve our goal of determining which style or styles of leadership are best suited to implementing the diversity agenda in institutions of higher education, we examined two areas: first, how each manuscript addressed the type and role of diversity-related organizational change; and second, how authors approached the concept of leadership and leadership style.

Although this chapter focuses on leadership style, isolating leadership from organizational change gives an incomplete picture because many diversity-related transformation paradigms are inextricably linked to distinct leadership styles (Aguirre and Martinez, 2006). As we noticed early in this research, few writers expressly addressed or referenced to leadership style, and just one paper (Kezar and Eckel, 2008) explicitly referred to transactional, transformational, or full-range leadership styles.

We began our research by reading each of the 10 manuscripts and using our knowledge of the literature to establish broad inductive codes for references to

leadership and leadership styles. Then we utilised a logical approach to assess if the leadership strategies, tactics, and style were consistent with the theoretical literature. Finally, we employed inductive approaches (Boyatzis, 1998) to find important leadership themes that were not covered in the transactional, transformational, or full-range leadership literatures. The ten papers we looked at for this study revealed two significant themes about the nature of change and leadership style.

To begin, each book emphasised the necessity of transforming organizational culture as well as transformational change as the type of change required to address campus diversity.

Many – but not all – texts depicted the evolution of corporate culture as a series of steps.

Second, the majority of authors emphasised the importance of leaders in leading organizational culture change, and that leaders used a variety of transformational, transactional, or both leadership styles and tactics (i.e. full range leadership).

Our findings led us to the conclusion that there is no particular leadership style that is best suited to directing higher education diversity reform. Rather, much of the research for this article backs up Williams' assertion that "campus diversity champions must be sophisticated in their approach and willing to work against the time-honored traditions and time-bound bureaucracies that render academic institutions so resistant to change" (2013, 206).

Our findings also led us to concur with Kezar, Eckel, and colleagues' conclusion (2008, p. 87) that "leaders need to take a diverse and varied approach to leadership," which encompasses both transactional and transformational strategies.

The level of sophistication, complexity, and variation required to lead the organizational transformation mandated by the diversity agenda is most directly tied to the full-range leadership strategy.

Only Kezar and Eckel (2008) specifically cited leaders using this strategy to promote diversity-related organizational change. Finally, numerous authors chose to classify leadership styles according to Bolman and Deal's (2017) four-frames theory of organisations and leadership rather than categorising them as transformational or transactional.

The 'collegial leadership frame' was added to the four frames by Williams (2013) and Williams and Wade-Golden (2013). In the ensuing session, the type and goal of change that these leaders have on their agenda will be examined. The purpose of change and the stages of change

Transformational transformation was identified either explicitly (Aguirre and Martinez, 2006; Anderson, 2008; Chun and Evans, 2009; Williams, 2013, Williams and Wade-Golden, 2013) or implicitly (Aguirre and Martinez, 2006; Anderson, 2008; Chun and Evans, 2009; Williams, 2013, Williams and Wade-Golden, 2013) implicitly, (i.e. Kezar, 2007, 2008; Kezar and Eckel, 2008; Kezar, Eckel et al., 2008;

Kezar, Glenn et al., 2008), as required by the diversity agenda's organizational change prescriptions. The full-range leadership strategy is most closely linked to the level of sophistication, complexity, and variation required to lead the organizational transformation necessitated by the diversity agenda.

Only Kezar and Eckel (2008) mentioned leaders who used this method to encourage diversity-related organizational change. Finally, rather than categorising leadership styles as transformational or transactional, many authors choose to categorise them according to Bolman and Deal's (2017) four-frame theory of organisations and leadership.

Williams (2013) and Williams and Wade-Golden (2014) added the 'collegial leadership frame' to the four frames (2013). The type and objective of change that these leaders have on their agenda will be discussed in the following session. The reason for change, as well as the stages of change Transformational change was identified, either explicitly or implicitly. Every source that inferred transformational change referred to projects or actions intended at bringing about deep, pervasive, and long-lasting transformations, as defined by the definition of transformational change (Eckel and Kezar, 2003).

Diversity at colleges and universities was assumed to demand a shift in organizational culture in order for institutions to become inclusive (Aguirre and Martinez 2006). Implementing the diversity agenda and changing organizational culture unfolds in stages, and executives recalled adopting various leadership methods and styles as the process progressed (Anderson 2008; Kezar 2007, 2008; Kezar and Eckel 2008; Kezar, Eckel et al. 2008; Williams 2013). According to Kezar (2007), the institutionalisation of diversity initiatives or agendas occurs in three phases; the first, the structural phase, refers to campuses that typically lack a diversity agenda and have few diversity debates.

Organizations that "have a diversity agenda and continuing conversations connected to race, gender, socioeconomic status, and other characteristics of diversity... [and] have a clear discourse related to diversity and supporters devoted to diversity" are considered to be in the behavioural phase (Kezar, 2007, p. 418).

Finally, schools "have mostly institutionalised a diversity agenda... and have frequent monitoring tools to keep track of their diversity efforts and ensure they are making progress" (Kezar, 2007, pp. 418–419) in the cultural phase.

In the third, or cultural, phase, institutions have achieved tremendous progress. For starters, "diversity is either not on the radar or is deemed a hindrance from promoting academic excellence goals... There are few programmes and insufficient infrastructures for supporting diverse students, professors, and staff, and diversity is not defined as an institutional goal" on start-up campuses (Williams 2013, p. 197).

The second, transitional stage is associated with organisations where "diversity becomes a topic of conversation among senior leadership... no substantial institutional

structure or agenda has formed" (Williams, 2013, pp. 199–200). Existing diversity initiatives in stage two schools are primarily isolated. As institutions progress to the third, mature implementation stage, the diversity agenda begins to emerge as a priority, and

senior leaders generally have a strong awareness of diversity issues... they still do not define their work in terms of inspiring institutional change and transformation, but rather in more incremental terms (Williams, 2013, p. 201).

Stage three campuses may spend a lot of time in the mature implementation phase... [and many] have produced several diversity plans' (Williams, 2013, pp. 201–202), but due to a lack of a robust accountability mechanism, these plans are only partially successful.

Institutions where "diversity is broadly defined and happens at the highest level of institutional importance as foundational to mission fulfilment and academic performance..." are considered to be in the fourth and final stage of inclusive excellence. [and] has established a cultural value that can be seen in a variety of forms' (Williams, 2013, p. 203).

The diversity agenda begins to emerge as a priority as institutions proceed to the third, mature implementation stage, and '[s]enior executives generally have a firm understanding of diversity concerns...

They continue to define their work in incremental terms rather than as encouraging institutional change and revolution' (Williams, 2013, p. 201) The mature implementation phase on stage three campuses may take a long time...'[and] many have formed various diversity plans' (Williams, 2013, pp. 201–202), but due to a lack of a robust accountability mechanism, these plans are only partially successful. Institutions where "diversity is broadly defined and occurs at the highest degree of institutional importance as foundational to mission fulfilment and academic achievement..." [and] has developed are considered to be in the fourth and final stage of inclusive excellence.

Although presidents' particular skills to gather and deploy the resources needed for transformative change justify this narrow emphasis, the attention dedicated to presidents in these books stems from a long-term study of presidential transformational leadership.

Williams (2013, p. 176) stressed the importance of senior-level leadership commitment, saying, "[m]ore than any other component, the leadership's commitment to deep and meaningful transformation will determine whether the institution gains capacity for the long-term."

If the diversity agenda is to achieve its goal of a significant and permanent change in organizational culture, senior executives such as presidents, provosts, deans, and other administrators must be involved (Aguirre and Martinez, 2006, p. 81).

Williams and Wade-Golden (2013) and Williams (2013) examined the job of the chief diversity officer (CDO) and presented examples of other senior-level leaders.

Despite the fact that Chun and Evans (2009, p. 50) defined the CDO as a "structural best practise," Williams and Wade-Golden (2013, p. 32) point out that "cohesion on a definition and the scope of the CDO's role is lacking."

The Chief Diversity Officer (CDO) is a senior administrative post with cross-functional responsibilities that supports diversity-related organizational change as a shared priority at the highest levels of leadership and governance.

The CDO, who reports to the president, provost, or both, is an institution's highest-ranking diversity administrator.

In order to create an inclusive and fantastic environment for everybody, the CDO is an integrative role that coordinates, leads, enhances, and in certain circumstances oversees the institution's official diversity competencies. In addition to senior-level CEOs, other institutional leaders play an important role in advancing the diversity agenda and creating corporate culture change. For example, Anderson (2008) emphasised the importance of faculty leadership in incorporating diversity into the teaching and learning process.

According to Chun and Evans (2009), individuals from the campus community must be given the opportunity to lead, leadership must be distributed, and decision-making must be decentralised in order for diversity to be fully incorporated into higher education institutions.

Senior-level authorities (e.g., boards of trustees, presidents, and CDOs), academic and other administrative leaders, and other 'campus constituent organisations' were all named in the report (Chun and Evans 2009, p. 44).

Transformational leadership is implicitly implicated as one feature of the full-range style in little over half of the texts examined, and it is expressly implicated as part of a full-range leadership strategy in one example (Kezar and Eckel, 2008). In half of the texts, the full-spectrum leadership approach was mentioned (Kezar, 2007, 2008; Kezar, Eckel et al., 2008; Williams, 2013; Williams and Wade-Golden, 2013).

Only Anderson (2008) made a clear connection between transactional and transformational leadership; none of the other research did.

Despite the fact that no one in the literature has recommended pursuing diversity-related cultural transformation in this way, they advocated for transactional leadership techniques.

Presidents used transactional approaches in each phase of the diversity agenda implementation process, according to Kezar (2007), such as linking the diversity agenda to resource allocation decisions, implementing incentive and reward structures, and instituting penalties for failing to advance diversity-related goals.

According to research by Kezar, Eckel, and colleagues (2008, p. 88), presidents use a transactional approach to distribute resources and incentivize participation and

adoption of the agenda at the 'beginning of campus efforts,' and incentives 'became important to foster student retention and [to] reward units for meeting key goals' in later phases. The use of data was highlighted in several writers' perspectives on accountability mechanisms linked with transactional leadership strategies (Chun and Evans, 2009; Kezar, 2007; Kezar and Eckel, 2008; Kezar, Eckel et al., 2008; Williams, 2013; Williams and Wade-Golden, 2013). The transactional leadership element of management by exception was evident in all of the works that looked at data-based accountability regimes.

Data, for example, was revealed to be utilised to guide decision-making processes, presumably to distribute punishments and rewards, according to Kezar (2007). Another example of management by exception is using data to hold deans accountable for meeting targets related to faculty diversification initiatives (Kezar, Eckel et al., 2008). Aguirre and Martinez (2006) and Anderson (2008) highlighted the transformational style as the best option for advancing the diversity agenda, whereas Chun and Evans (2009) recommended a transformational leadership strategy.

Aguirre and Martinez (2006, p. 36) emphasised transformational leadership in their "diversity leadership" model, stating that "transformational leadership is conceived as a type of leadership needed by organisations to respond and adapt to environmental change, that is, demographic and cultural diversity."

Furthermore, "transformational leadership allows the organisation to be regarded as reacting to the collective desire for identity and commitment between people and organizational culture," according to Aguirre and Martinez (2006, p. 36). 'Diversity is best served by... leaders who appreciate the forces that compel firms to change and who display the traits associated with transformational leadership,' Anderson (2008, p. 5) continued.

According to Chun and Evans (2009), a reciprocal empowerment strategy is optimal for implementing diversity-related change. Reciprocal empowerment, like transformational leadership, appeals to organizational members' values and morals, and both strategies empower individuals and create supportive and inclusive environments as a means of bringing about change (Chun and Evans, 2009; Kezar and Eckel, 2008). Transformational leadership was mentioned in the majority of the ten texts we looked at, and it referred to a leader's ability to build and maintain relationships, establish and articulate a vision of an inclusive and equitable campus, and push individuals to take action. Presidents, according to Kezar, Eckel, and colleagues (2008), create contacts, or a "network of support," throughout the campus and outside community in order to accomplish their objectives.

The development and communication of a vision is a critical transformative leadership technique. One effective president, according to Kezar, Glenn, and colleagues (2008), involved the entire institution in establishing a diversity vision.

This strategy allowed members of the institution to think critically and creatively about themselves, their work, and the institution while simultaneously offering a secure space for individuals and groups to communicate their thoughts, feelings, and experiences.

Despite the fact that Kezar and Eckel (2008) identified full-range leadership as the best fit for leading the organizational change mandated by the diversity agenda, the majority of the texts reviewed for this chapter implied a mix of transactional and transformational approaches.

Williams (2013) and Williams and Wade-Golden's (2013) use of the 'strategic diversity leadership' concept implicated a full-range style of leadership, as did Kezar, Eckel, and colleagues' (2008) use of the four frames theory of leadership.

Both Kezar's (2008) study of political leadership and her 2007 analysis of the steps of institutionalising the diversity agenda presume full-range leadership. Finally, in Kezar, Eckel, and colleagues' (2008) examination of the Diversity Scorecard Project, full-range leadership was inferred to a lesser amount than in prior research.

The adoption of transactional and transformational tactics by presidents is influenced by context and situational situations, according to Kezar and Eckel (2008). 'Presidents appear to have assessed institutional culture to see if transactional or transformational leadership is more aligned with campus expectations,' they discovered (Kezar and Eckel, 2008, p. 399).

Presidents routinely examined their institutions, or 'mapping the political terrain,' as Bolman and Deal (2017) put it, to establish proactive tactics for neutralising resistance to the diversity agenda, as well as whether and how to engage friends and coalitions, according to Kezar (2008).

The full-range style was utilised in works that envisioned the diversity agenda being implemented in either of the two stages and stage models mentioned previously. As their institutions cycle through three or four stages of diversity agenda implementation, presidents and diversity leaders must choose between transactional and revolutionary approaches.

Based on Kezar's (2007) three-phase model, presidents of phase one institutions reported using transformational approaches such as idealised consideration to engage in institution-wide dialogue and role model new institutional values; and idealised influence to communicate a vision of a diverse and inclusive campus. As they strove to 'broaden the ownership' (Kezar, 2007) of the agenda and began to use data to drive decision-making processes and implement accountability measures, leaders of medium phase or stage institutions were most likely to employ transactional techniques. Faculty diversification efforts, for example, are among the most likely to spark hostility to the diversity agenda, according to Kezar (2008), needing transactional techniques like Using statistics to rebut arguments against hiring diverse professors,

establishing financial rewards and incentives (Williams, 2013), and implementing accountability techniques for academic leaders (Kezar, Eckel et al., 2008).

Transformational styles emerged as institutions progressed into the intermediate stage of implementing the diversity agenda. Williams (2013), Kezar (2007), Kezar and Eckel (2008), Kezar, Eckel, and colleagues (2008) all emphasised the importance of 'revitalizing the agenda' through transformational approaches that appeal to people's experiences, ideas, and creativity.

As the diversity agenda implementation process developed, leaders continued to deploy both transactional and transformational strategies.

According to Kezar, presidents on phase three schools employed transformational leadership practises to enable students and the surrounding community to learn about diversity in many ways (2007, p. 431) [and] was concerned with challenging old beliefs and working methods, as well as finding measures to better support kids from diverse backgrounds. Campuses in the later stages invest time and resources in developing their members' capability and learning through organizational learning procedures and faculty mentorship programmes (Kezar, 2007; Kezar, Eckel et al., 2008).

In terms of transactional approaches, the majority of literature referred to the accountability regimes of later-stage institutions as among the most robust and pervasive (Kezar, 2007; Kezar and Eckel, 2008; Kezar, Eckel et al., 2008; Williams, 2013).

This understanding appears to be mostly a priori, although as Kezar and Eckel (2008) pointed out, example diversity accountability systems are sparse. Finally, as institutions began to implement more difficult aspects of the diversity agenda, transactional techniques emerged as the most effective, which, not surprisingly, are also the most vital for promoting cultural shift (e.g. Kezar and Eckel, 2008).

CONCLUSION

We came to two conclusions after reviewing studies on the significance of leadership style in furthering the diversity agenda in higher education.

To begin with, there is no single leadership style that is best suited to implementing the diversity agenda at colleges and universities. Rather, in a manner that resembles full-range management, leaders employ both transactional and transformational Second, we discovered that when determining whether to pursue a transactional or transformational strategy, strong leaders evaluate a range of contextual considerations.

This analysis of the research literature highlights the scarcity of studies linking leadership style to organizational contextual characteristics such phase or stage of diversity agenda implementation.

The implications of these discoveries for future study and practise are numerous. Much of the research on leadership styles is over a decade old, and it needs to be updated in light of the growing interest in diversity leadership and contemporary anti-diversity More emphasis must be made to leaders other than presidents and CDOs in research on the role of leadership in executing the diversity agenda.

Only Anderson (2008) addressed the function of faculty leadership in a significant way among the manuscripts we looked at for this chapter. While conventional wisdom, existing practises, and our analysis all point to the president's essential role in enacting diversity agendas, presidents alone cannot bear the burden of cultural change; as Birnbaum (1992, p. 151) pointed out, "presidents are not the only source of leadership." According to Kezar et al., (2011, p. 147), faculty and staff grassroots leadership is a crucial tactic for enacting the diversity agenda because it is "linked with academic culture and institutional techniques" and "allows grassroots leaders to work under the radar."

With the exception of Williams (2013) and Williams and Wade-Golden (2014), few researchers have looked into how institutional leaders might best align professors, staff, and students' efforts to fulfil the diversity agenda (2013).

Future Research

Future research should delve into the function of identity in directing the execution of the diversity agenda. Despite the fact that "little of the literature investigated the impact of race and gender," Owen (2009) observed that "[diversity] leaders in higher education are not presumed to be White males" and that "men of colour are equally prevalent as women in [diversity leadership positions]" (p. 186).

Recognizing the role of race and gender in the appointment of women and people of colour to senior leadership positions (Jackson, 2003, 2004, 2008; Jackson and O'Callaghan, 2009, 2011), as well as the role of gender (Eagly and Johannesen-Schmidt, 2001; Eagly and Johnson, 1990; Young, 2004), race (Ospina and Foldy, 2009), and the role of race (Ospina and Foldy, 2009). Researchers and practitioners alike should think about how race and gender interact in informing leadership practise (Christman and McClellan, 2008; Eagly and Chin, 2010; Gasman et al., 2015; Jean-Marie et al., 2009; Wolfe and Dilworth, 2015).

According to Kezar and Eckel (2008, p. 396–397), race influences people of color's leadership styles, with "over half of the presidents of colour [in their study]" wary of transformational approaches "because of the way white stakeholders might perceive [their] choice [of pursuing the diversity agenda] as a personal agenda or self-interest rather than an institutional imperative."

Higher education institutions will continue to encounter significant challenges in aligning their policies and practises with their stated dedication to diversity. Regardless

of their institutional position, leaders continue to face the task of transforming stodgy academic cultures and decentralised academic organisations.

Despite the fact that researchers and practitioners have long wrestled with the issue of altering college and university cultures to become more inclusive and equitable, coordinating and intentional activities to change change-resistant institutions remains a difficult task.

It will be simpler to tackle the tremendous challenge of implementing an equity-driven agenda if special emphasis is paid to the position and style of leadership necessary.

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Chapter 7
Management of Digital Innovation

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ABSTRACT

Digital technologies are putting tremendous pressure on businesses to renew and transform their business models. The transformation of business models using digital technologies will lead the businesses to innovate themselves digitally. To improve operational efficiency, customer engagement, and launch successful new products, every organization must innovate. The application of new digital technologies to solve existing business problems and improve organizational practices is known as digital innovation. Digital innovation has become critical to the long-term viability and growth of businesses. To stay relevant and competitive, any company aiming for long-term success should embrace digital innovation. This chapter tries to find out the existing definitions of digital innovation from socio-technical perspectives regarding product, service, process, digital system, organizational innovation, and business models and tries to develop a framework to organize digital innovation research.

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INTRODUCTION

Companies are under enormous pressure to use digital technologies to renew and transform their business models. The transformation of business models using digital technologies will lead the businesses to innovate themselves digitally. Every organisation must innovate in order to improve operational efficiency, customer engagement, and the successful launch of new products. The use of digital technology and applications to improve business processes and workforce performance, improve customer experience, and introduce new products or business models is referred to as digital innovation.

Digital innovation has piqued the interest of academics and practitioners alike (e.g., Holmstrom et al., 2021) from a variety of fields, including economics, strategy, and marketing (Konya-Baumbach et al., 2019; Autio et al., 2018; Beltagui et al., 2020). Digital technology's pervasiveness has altered not only how we strategize and organise to create innovation (Bharadwaj et al., 2013; Lyytinen et al., 2016), but also how we carry out "new combinations of digital and physical components to produce novel products" (Yoo et al., 2010), has changed the nature of innovation itself (Nambisan et al., 2020). Innovation is a thriving field of study with new contributions being made all the time, such as digital innovation (Yoo et al., 2010), open innovation (Bogers et al., 2017), user-led innovation (von Hippel, 1988) and employee-driven innovation (Høyrup, 2010). There is a remarkable interconnection between social actors and digital technologies involved in digital innovations (Sandberg et al., 2020; Wang, 2021). The emergence of complex sociotechnical systems as a result (Mousavi Baygi et al., 2021; Tilson et al., 2010) necessitates research into "technical artifacts as well as the individuals/collectives that develop and use the artifacts in social contexts" (Sarker et al., 2019). When investigating digital innovation, we as a field must therefore focus on both human and technical artifacts (Majchrzak and Griffith, 2020; Yoo et al., 2012). This speaks directly to the Information Systems (IS) discipline's sociotechnical core, with some even predicting a "golden age of digital innovation, providing an unprecedented opportunity for the IS field" (Fichman et al., 2014). As a result of the use of digital technology, new market offerings, business processes, and models can emerge. Digital innovation has been studied as a process (Yoo et al., 2010) or as an outcome (Fichman et al., 2014). We argue that when it comes to combining digital technologies in novel ways or with physical components to enable socio-technical changes and create new value for adopters, it should be examined as both a process and an outcome (Osmundsen et al., 2018). The interdependencies between the innovation process and the innovation outcome have become more complex and dynamic as a result of digitalization, challenging some of the well-known prerequisites for innovation (Nambisan et al., 2017), which have traditionally viewed innovation processes and outcomes as separate

phenomena. Furthermore, the rise of employee-driven innovation calls into question existing assumptions, such as the notion that the nature of the innovation agency is centralised, arguing that actors/entities can organise for innovation (Nambisan et al., 2017). As new digital products and services emerge, the concept of digital innovation needs to be further developed in both the academic environment and public debate (Holmstrøm, 2018). This study offers a socio-technical definition of digital innovation, as well as a framework based on that definition, as well as some gaps and directions for future research. The goal of this paper is to contribute to the advancement of existing knowledge about digital innovation while also offering a fresh perspective for future research. In light of previous discussions, we have proposed the following two guiding research questions (RQs):

RQ1. What is the current state of knowledge and understanding of digital innovation from socio-technical perspective?
RQ2. What are the future research directions need to be recognized based upon existing works and to develop a framework?

This study has been divided into five sections. We begin by providing a broad overview of the topic and posing a few key research questions. In the second section, we present the literature review of digital innovation based on socio-technical based on literature review method. In the third section, we presented the theoretical framework on digital innovation, its various variables and the types of innovation, its benefits, diversity as a driver of digital innovation, steps to embrace digital innovation. Finally, we present discussion, research conclusion and future outlook in the fourth and fifth section

DIGITAL INNOVATION

Digital innovations are the result of the implementation of digital technologies and the properties of those technologies when they are combined. The concept of digital innovation necessitates a fundamental shift in business operations (Tiwari, 2022). Incorporating digital technology into a previously unexplored product or service is referred to as "digital innovation" (Henfridsson et al., 2010). The adoption of digital technologies to meet the needs of today's customers in terms of business processes is referred to as digital transformation, culture, and organisational aspects. Digital technology has been critical in achieving business goals, and its pervasive effects have transformed entire industries (Nylen and Holmstr¨om, 2015) leading to innovative products, services, processes and business models. Innovation is a buzzword as well as a multifaceted concept that can be viewed from various angles

and disciplines (Høyrup, 2010). Innovation is a thriving field of study with new contributions being made all the time, such as user-led innovation (von Hippel, 1988), open innovation (Bogers et al., 2017), digital innovation (Yoo et al., 2010) and employee-driven innovation (Høyrup, 2010).

Digital innovation can result in new market offerings, business processes, or business models. Digital innovation has been studied both as a process and as a product (Yoo et al., 2010) or as an outcome (Fichman et al., 2014). We contend that when it comes to combining digital technologies in novel ways or with physical components to enable socio-technical changes and create new value for adopters, it should be viewed as both a process and an outcome (Osmundsen et al., 2018). The interdependencies between the innovation process and the innovation outcome have become more complex and dynamic as a result of digitalization, challenging some of the well-known prerequisites for innovation (Nambisan et al., 2017), which have traditionally viewed innovation processes and outcomes as two distinct phenomena. Organizations must incorporate digital technologies into the very core of their products, services, and work processes, so digital innovation is unavoidable (Yoo et al., 2012). Yoo et al. (2010) also discuss how digital products, services, and processes are based on the characteristics of digital information, such as its ability to be easily stored, changed, transmitted, and tracked; its ability to be edited through programming; and its self-referencing nature. Organizations must incorporate digital technologies into the very core of their products, services, and work processes, so digital innovation is unavoidable. However, digital products and services can be influenced more easily than physical products; "ordinary employees" can also contribute to the innovation processes. Digital innovation is defined as the use of digital technology in the creation, adoption, and exploitation of an inherently unbounded, value-adding novelty (e.g., a product, service, process, or business model) (Henfridsson et al., 2018; Nambisan et al., 2017).

In the digital age, "digital business" refers to a completely new way of thinking about and designing businesses (Hinings et al., 2018; Pramanik et al., 2019). Using technology to innovate and find new ways to transform the world through digital means (Yoo et al., 2010). The concept of new ICT products is added to the definition of digital innovation, which is similar to that of technological innovation. A more specific definition of "digital innovation" is the implementation of a new or significantly improved ICT product over an existing one (solution). Technology-driven innovation is defined as the application of information and communication technology (ICT) in business operations or external relationships to implement new or significantly improved processes, marketing strategies, or organisational methods. As a result of the use of digital technology, new market offerings, business processes, and models are created (and subsequent changes are made) (Nowicka, 2019). There is a strong link between digital technology and digital transformation

and the development, diffusion, or assimilation of a new idea. Digital innovation, according to Lyytinen, (2021), is fueled by digital technology's ability to generate new ideas. Digital innovation and its outcomes are characterised by creativity and the platformization process (Gawer, 2021), which can be challenging to manage at times (Leiponen et al., 2021). A new business model has emerged as a result of the introduction of digital technologies, one that aims to provide more value than what is currently available (Nowicka, 2019). Nambisan (2020) demonstrates how, by leveraging the inherent generativity of digital technology, multinational corporations can now connect with global markets and resources while also pursuing innovation in new geographies. Hron et al. (2021) suggested that the generative nature of digital technology could lead to innovation drift. They can be used as a springboard for the next stage of digital network development. In organisations undergoing these rapid transformations, the scope of digitalization now includes managing processes and digital products and services (Büyüközkan and Göçer, 2018). New approaches, such as digital transformation using technology, must be used to reap the benefits of digitalization. One of the most crucial aspects of a company's digital transformation is the digitization of all business processes that can be digitalized (Hagberg et al., 2016). The collection of large amounts of data from various sources (Frank et al., 2019), leads to the development of a user-friendly interface (Pramanik et al., 2019). The ability of a company to adapt to new technologies is critical to its digital transformation success (Frank et al., 2019). Stakeholders are involved in digital transformation, which is defined by Büyüközkan and Göçer (2018) as a set of interconnected activities carried out using new technologies. As a result of new approaches such as digital transformation and technological innovations, digital transformation has the potential to generate competitive value and network effects (Büyüközkan and Göçer, 2018). In the modern economy, the properties of digital technologies in general are the primary drivers of change. Digital technologies combine information, processing, communication, and technology. Digital innovation is the use of digital technologies to create new products, processes, and business models for the market (the resulting changes). A new idea cannot be generated without the use of digital technologies and processes (Nambisan et al., 2017). Three aspects of digital innovation can be defined using this definition.

- Despite the fact that the effects (results) are not always digital, digital technologies have spawned innovative new products, platforms, services, customer experiences, and other methods of delivering value.
- In order to introduce new innovations (Dubey et al., 2012), businesses are turning to various digital tools and infrastructure, such as the Internet of Things (IoT) and blockchain technology (Tiwari. 2020; Tiwari et al., 2022).

Table 1. Definitions of digital innovation as socio-technical

Author	Definition
Hund et al., (2021)	Digital innovation a sociotechnical phenomenon and conceptualize it "as the creation of (and consequent change in) market offerings, business processes, or models that result from the use of digital technology
Lanzolla et al., (2021)	Digital innovation does not require holistic knowledge about the underlying product architecture; individual actors are empowered to participate in complex innovation processes.
Mousavi Baygi et al., (2021)	In digital age of fluidity requires us to move away from theorizing socio-technological transformation using an actor-centric habit of thought and vocabulary, whereby bounded actors are deemed as the significant and original causes of transformation
Markus & Nan, (2020)	Digital innovation is an innovation process involving sociotechnical combinations of digital technologies and complementary material and ideational resources and the direct outcomes of that innovation process, such as the creation, introduction, and use of a new product, process, or business model"
Verganti et al., (2020)	The current constraints in innovation processes can be potentially overcomes by digital technology by augmenting human capabilities.
Vega and Chiasson, 2019	Digital innovation must enable the creation of new value, which results in continuous changes in the sociotechnical environment (market offerings, business processes, and individual behaviour).
Sarker et al., 2019	The emergence of complex sociotechnical systems requires research to consider "technical artifacts as well as the individuals/collectives that develop and use the artifacts in social contexts"
Skog (2018)	Digital innovation is defined as the creation, adoption, and exploitation of an inherently limitless, value-adding novelty using digital technology (e.g., product, service, process, or business model).
Kohli & Melville (2018)	"Digital innovation" refers to a product-centric approach that involves new combinations of physical and digital products to create new products. In this conceptualization, the role of underlying architectures of IT artefacts in enabling and constraining the development of new IT artefacts, as well as the implications for structuring and managing innovation within firms"
Nambisan et al., (2017)	Digital innovation must enable the creation of new value, resulting in continuous changes in the sociotechnical environment (e.g., market offerings, business processes, and individual behaviour).
Svahn et al. (2017a)	"Digital innovation is largely about recombining existing resources and knowledge to spur new ideas. It is rarely guided by a long-term vision, because products and services are inherently unbounded and incomplete. Instead, digital innovation is powered by a self-contained system's generative capacity to produce something new without input from the system's originator"
Woodard et al. (2013)	"Digital innovation—the process of leveraging digital artifacts to transform existing physical products or create new ones—offers a powerful lens for developing such frameworks. The concept of digital innovation draws attention to the ways in which firms recombine, reconfigure, or design new digital artifacts in response to competitors' actions or windows of market opportunity"
Barrett et al. (2012)	Digital innovation is defined as "the transformation of sociotechnical structures that were previously mediated by non-digital artefacts or relationships" and is enabled by digital technologies.
Yoo et al., 2012	Digital innovation is unavoidable because companies must incorporate digital technologies into the very core of their products, services, and work processes.
Tilson et al., 2010,	"A sociotechnical process of applying digitising techniques to broader social and institutional contexts," defines digitalization.

- The effects of digital innovations, such as digital platform use, can be disseminated, accepted, or personalised to meet specific needs.

Figure 1 depicts the socio-technical aspect of digital innovation, which was developed based on the above definitions of digital innovation.

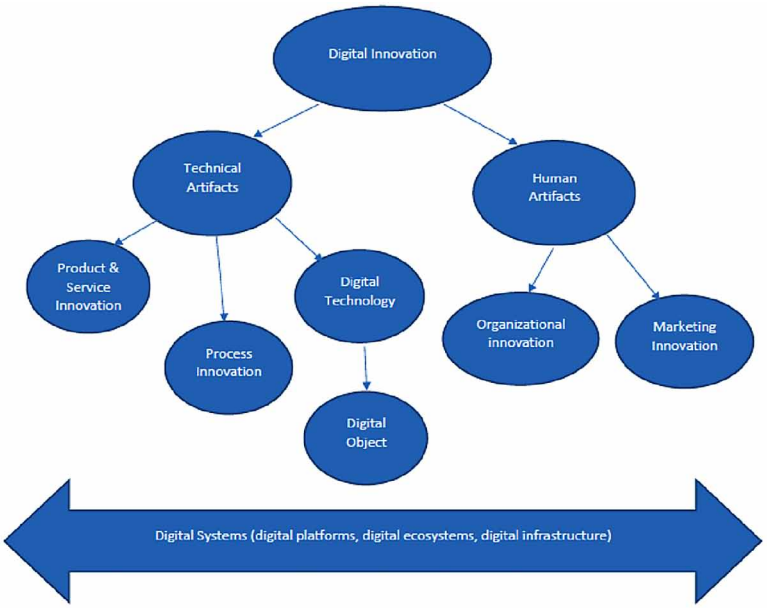
FRAMEWORK FOR DIGITAL INNOVATION

Digital innovation is the creation, introduction, and use of a new product, process, or business model, as well as the direct outcomes of that process, such as the sociotechnical combination of digital technologies and complementary material and conceptual resources (Markus and Nan, 2020). It refers to a product-centric approach that involves creating new products by combining physical and digital components. The role of underlying IT artefact architectures in enabling and constraining the development of new IT artifacts, as well as the implications for structuring and managing innovation within firms, is discussed in this context (Kohli and Melville, 2018). Digital innovation must enable new value creation, which leads to ongoing changes in the sociotechnical environment (i.e., market offerings, business processes, and individual behaviour). Thus, using digital technology, digital innovation entails the creation, adoption, and exploitation of an inherently limitless, value-adding novelty (e.g., product, service, process, or business model) (Skog, 2019). Table 1 lists just a few of the many types of innovations that enable digital innovation. When studying digital innovation as a field, we must consider both human and technical artifacts (Majchrzak and Griffith, 2020 Yoo et al., 2012; Tiwari, 2022). The term "technical artifacts" refers to technical aspects (technology, tasks, routines, etc.), whereas "human artifacts" refer to social aspects (human interactions, relationships, norms, etc.). Digital platforms, digital ecosystems, and digital infrastructures are among the various resources required to support digital innovations in digital systems. Digital innovation encompasses digital technology, which includes digital objects as a subset. The term "digital object" refers to the technical side of digital innovation, whereas "digital technology" refers to the sociotechnical side. The term "digital innovation" is defined in terms of its added-value novelty. Figure 1 shows framework for digital innovation and its constituent. The various technical and human artificats are presented in table 2.

Digital Innovation vs. Digital Transformation

Digital innovation and digital transformation are used interchangeably. However, the question here is if the two concepts are synonymous or different – and while digital Innovation and digital transformation are similar concepts, they have stark differences. While due to a mutually causal relationship, one can lead to the other. Nevertheless, digital innovation is usually a sudden change and in response to an existing (or new) problem. Digital transformation is a long, strategic journey leading to a fundamental change in the overall organization. Digital innovation is comparatively at a smaller scale than a digital transformation initiative in an organization. In short,

Figure 1. Framework for Digital Innovation



digital innovation is changing or adding individual areas of an organization while digital transformation is an overall business renovation

Diversity Is a Key Driver of Innovation

The business case for diversity and inclusion is intrinsically linked to a company's innovation strategy. Multiple and varied voices have a wide range of experiences, and this can help generate new ideas about products and practices. The basic formula for diversity is rapidly evolving. It is no longer simply a matter of creating a heterogeneous workforce, but using that workforce to create the innovative products, services, and business practices that can set a company apart and give it a competitive advantage in the marketplace. Moreover, as companies compete on a global scale, diversity and inclusion frequently have to shift, as different markets and different cultures have varied definitions of what diversity means. Today, diversity and inclusion efforts are de rigueur for almost all companies. Executives understand that their companies cannot be successful on a global platform if they don't have a diverse and inclusive workforce. A diverse and inclusive workforce is necessary to drive innovation, foster creativity, and guide business strategies. Multiple voices lead to new ideas, new services, and new products, and encourage out-of-the box thinking. Companies no longer view diversity and inclusion efforts as separate from their

Table 2. Definitions of types of innovation

Innovation Types	Definition of Innovation	Author
Product & Service Innovation	Product innovation is the creation of novel products, changes to current product designs, or the application of new techniques and methods in current manufacturing methods. Market and customer demands, as well as technological changes, are the main drivers of service innovation.	Bacchiega et al. (2011); Bocquet, (2011); Bigliardi & Dormio(2009); Wagner & Bode(2014); Ganotakis et al. (2013); Barrett et al. (2015)
Process Innovation	Improvements to the production process' efficiency and effectiveness are at the heart of process innovation. Changing the way products and services are developed and delivered to customers is part of the process.	Higgins, (1995); Bigliardi & Dormio(2009; Wagner & Bode(2014); Ganotakis et al. (2013)
Digital technology	Digital technology has both technical and social components, such as material and nonmaterial objects that users assign meaning to and thus shape the product boundary. Product designers frequently don't know how their products – or single components of them – will be used from the start; instead, "a product is inductively enacted by orchestrating an ensemble of components".	Yoo et al., (2010); Faulkner & Runde, (2009): Nambisan et al., (2017); Verganti et al., (2020)
Digital Object	Digital objects are purely technical objects such as bitstrings, bitstrings follow a set of syntactical rules, e.g., of a specific file format. It has no spatial attributes, but are structured (composed of distinct, organized parts) and enduring (once created every part of a bitstring exists simultaneously). digital object captures the technical perspective on digital innovation	Faulkner & Runde, (2019); Faulkner & Runde, (2013).
Organizational Innovation	Organizational innovation signifies to the application of a novel organisational technique in a corporation's business approaches, such as workplace planning, workplace environment, job satisfaction and similarly exterior relations or as a result of these organisational innovations, collaborations among various supply chain actors, primarily suppliers, allow for profit maximisation while also achieving high levels of eco-efficiency.	Higgins, (1995); Damanpour & Evan(1984); Bigliardi & Dormio(2009); Osmundsen et al., (2018); Mousavi Baygi et al., (2021)
Marketing Innovation	To improve product design, placement, promotion, or pricing by implementing a new marketing strategy (marketing idea).	Wagner & Bode(2014); Ganotakis et al. (2013)
Digital systems	Digital systems consists of digital infrastructure, digital ecosystems and digital platforms. Digital infrastructures are not defined by pre-defined functions; it enable generative mechanisms that lead to self-reinforcing processes of innovation, adoption and scaling . These self-reinforcing processes help explain the causal forces shaping the evolution of digital infrastructures Digital platforms represent the extensible codebase of a software-based system that provides core functionality shared by the modules that interoperate with it and the interfaces through which they interoperate, platforms create their own ecosystem bringing together diverse contributors Digital ecosystems are defined as a collection of the platform and the modules specific to it, which create a number of specific market, regulatory and environmental contexts and develop their own evolutionary dynamics	Henfridsson & Bygstad, (2013); Tilson et al., (2010); Tiwana et al., (2010); Gawer, (2009); Gawer & Cusumano, (2014); Tiwana et al., (2010); Suseno et al., (2018); Beltagui et al., (2020); Wang, (2021).

other business practices, and recognize that a diverse workforce can differentiate them from their competitors and can help capture new clients. Competing on the global stage presents companies with a series of challenges. In addition to the

Table 3. Digital innovation vs. digital transformation

Digital Innovation	Digital Transformation
Digital Innovation usually refers to a sudden spark or creativity, and the incipient actions that lead to implementing that spark into a company's strategy.	Digital transformations take time—moving from one state to another is a process.
Digital Innovation requires encouragement, collaboration, and communication, but it typically implies clear steps that must be taken—it's the start of something great.	Digital transformation is the implementation process following that first spark of innovation. It also suggests an eventual end once the transformation has been completed.
Digital innovation is comparatively at a smaller scale	Digital transformation initiative in an organization and the scale is somewhat larger

routine concerns that companies face such as managing growth, building a sound infrastructure, and keeping an eye on the bottom line, expanding overseas has its own special challenges. Laws and regulations vary from region to region, and there are language and cultural barriers that can create unanticipated problems or challenges. Which is why organizations have found that the best way to ensure their continued success on a global scale is by having a diverse and inclusive workforce. Diversifying is considered as the most important task since it provides immense opportunities for possible choice of goods and services. The other advantages associated with diversifying the supply chain are cost and efficiency, along with it improves the sustainability approach and reputation (Tiwari, 2015). The supplies from large organisations has many advantages, as they provide a greater worldwide reach and accessibility of products and services and also legal advantages, and the lesser likelihood of default on the contrary sourcing from smaller and medium-sized enterprises has other advantages as it highlight the diversification. Companies across the world and associated with different sectors are now using technology and data to improve their operations and increasing efficiency since the higher dependency and easy adoption and implementation of digitalization will help them and meet the needs and expectations of their customers, create more opportunities for growth and enhancing business value. Businesses are now streamlining by rethinking and reengineering their entire process to improve business processes, cultures, customer experiences, and opportunities over and done with the implementation and usage of digital technologies. A general myth about digital transformation is that it bring

changes in terms of technology but by scanning, more about this transformation gives a total different picture since it is more diverted towards diversification. Therefore the organization and teams looking for transformation, for them priority of diversity is imperative. Human intelligence lead to the development of artificial intelligence (AI) and has made possible the utilization of enormous talents and vulnerable to their limits. The three pillars around which diversity revolves are: (1) People (2) Data and (3) Tools & Techniques

Inclusion for Competitive Advantage

Female specialists are increasingly in demand as part of a company's growth plan, as they provide a competitive advantage. When it comes to unlocking women's hidden potential, leaders can help bridge the skills gap by hiring more female employees. This term encompasses many different traits, talents, backgrounds, and views that each of us brings to the table. As an alternative, inclusion encourages employees to be real and to feel valued by taking advantage of their particular differences. Companies are constantly striving to improve in both diversity and inclusion, and there is always room for improvement. Inclusive leadership and inclusive team environments are two of the most important components of inclusion efforts, and they will be seen as crucial to building long-term connections. Many organisations are taking note of the growing number of women in supply chain roles and are constantly looking for ways to provide them with more opportunities (Tiwari & Bahuguna, 2022). Organizations must demonstrate a strong commitment and demonstrate it in order to improve a culture of diversity and inclusion, as candidates seek inclusive organisations.

Hiring and Retention Strategies for Female Workers

Historically, the role of functional expertise was considered as a part of organization core areas, with the primary focus area on optimising the various segments of organization functions on a regular basis using certain analytics tools. The future of digital operations will be largely reliant on smooth data transformation and enhanced communication across diverse stakeholders, such as customers, suppliers, and functions. Because of this, future roles will require not only knowledge that is more complex and understanding, but also a problem-solving approach and a wider knowledge of key functional areas that revolve primarily around critical functions such as synchronised planning, production, designing, warehouse management, and autonomous logistics. Future leaders must not only inspire the workforce's confidence, but also demand and acknowledge each individual's unique value. These are some of the things that the most developed and integrated institutions on the inclusive scale tend to perform most often:

- Inclusion without diversity is insufficient and must be understood.
- Inclusive leadership as the focus area
- Talent strategy with inserted inclusion
- Diversity and inclusion approach needs to be evolve continuously across business and lead to the evolvement of talent priorities.

Digital Innovation Benefits

Digital innovation has become imperative to sustain healthy businesses and achieve long-term growth. Here are four of the most impactful benefits of digital innovation that add value to the organization

1. **Innovation Provides a Competitive Advantage**: An effective digital solution focuses on three critical aspects- customer/partner engagement, product/service innovation, and internal systems/processes. Through digital innovation, organizations are able to address all three of these factors to create new revenue streams, diversify their offerings, streamline internal processes, and improve customer experience.
2. **Protects the Company from Threats:** Organizations who fail to embrace digital innovation – or are reluctant and offer resistance to this change – can fall behind their more well informed business competitors.
3. **Improves Productivity:** Low employee productivity can increase your operational costs and cut into overall revenue streams. However, organizations that invest in innovation can boost productivity in the following areas:
    a. Access to Big Data & Analytics: Data & analytics are critical to a successful digital innovation strategy. Digital innovation will help transform these data points into actionable insights.
    b. Automation: Technologies like artificial intelligence and machine learning can automate mundane tasks, allowing your employees to focus on the more strategic ones. Automation also reduces the chances of human error.
    c. Centralized Systems: Centralized systems reduce the information discovery time for employees through digital ecosystems, allowing them to find all the valuable information at a centralized location. This is the driving force behind the customer self-service movement.
4. **Increases ROI across Business Expenses**: Digital innovation streamlines your internal processes and improves equipment performance. It's an investment for long-term financial gains, resulting in substantial cost savings and high ROI across business expenses. While business digital innovation may seem expensive in the short term, organizations that invest in new and better ideas will reap those rewards over time.

5. **Allows Organizations to Keep Pace with Evolving Customer Expectations**: In a post-pandemic world, customer expectations have radically changed. To provide them with a personalized experience, organizations need to prioritize digital innovation. This allows you to analyze customer buying behavior and preferences, which further helps with personalization, allowing you to deliver individualistic experiences to all customer types

Steps to Embrace Digital Innovation in the Organization

It is expected that all the industries in future will transform digitally in order to remain competitive. Therefore, to stay relevant, organizations need to embrace digital innovation. The various steps needed to create an effective digital innovation strategy:

- **Create a Digital Innovation Team:** Create a small and focused team consisting of high-performing individuals from different departments who are committed to delivering value to your organization. This team should work to identify the shortcomings of your existing business processes and try to solve them through effective digital innovation solutions.
- **Adopt an Agile Experimentation Model:** As technology changes at a rapid pace, making agility a critical aspect of your digital strategy. In an agile experimentation model, organizations are able to adapt to new customer needs and are challenged to periodically change approaches to problems over time. Several organizations are creating incubator labs to brainstorm, experiment, and fast-track their way to digital innovation.
- **Invest in new and cutting-edge Technology:** To be at the digital forefront, organizations must invest in new software and innovative digital technology to improve their operational efficiency. The right technology will help you unify your business needs and include team management, collaboration, cloud access, and product lifecycle monitoring as core business concepts.
- **Create an ROI or Value-Added System for Prioritizing Projects:** Based on the criticality, size, and revenue generated from the project, you need to create a value-added system for higher digital innovation ROI. This allows organizations to prioritize the projects that will make the biggest impact both in the short-term and long term.
- **Create a Digital Adoption Strategy for New Processes and Tools:** Create a well-designed, specific digital adoption strategy to make the most of your technological investments. A digital adoption platform can be partnered to train and onboard employees. These solutions allow organizations to manage change efficiently, without losing productivity in the transition phase. This is done by empowering employees and users to learn in the flow of work

by providing contextual, in-app guidance through new digital processes and technologies.

DISCUSSION

This study explored the various research on digital innovation from the socio-technical perspective using the available literature analysis. According to the results of the present study, the various variables/ dimension contributing to digital innovation were discussed in two main areas (technical artifacts and human/social artifacts). The two main dimensions were further divided in six variables (product innovation, process innovation, and digital technology, organizational innovation, marketing innovation and digital systems). Digital systems umbrella consist of digital platform, digital ecosystem & digital infrastructure. These three terms are often used interchangeably, digital infrastructures are the basic information technologies and organizational structures, along with the related services and facilities necessary for an enterprise or industry to function" (Tilson et al., 2010), as a result, the technical foundation on which digital platforms are built. Platforms then allow various actors to create add-on software modules, a platform and its modules make up an ecosystem. (Tilson et al., 2010; Tiwana et al., 2010). According to the definition, digital innovation always includes both technical and social aspects. Every organisation must digitise internal operations in order to do things better, faster, and cheaper, as well as discover new ways to engage users and bring new products and services to market. Driving digital innovation, on the other hand, is difficult. Changing market conditions require organisations to plan around a moving target, and the proliferation of disruptive startups results in increased competition. Organizations require a faster way to turn innovative new ideas into winning applications. This is where digital innovation platforms come into play and prove useful. Organizations have started realizing the importance of bringing innovation into their system and process & the various advantages of innovation, which not only keep the competitive in the market but also helps in increasing productivity, ROI but also protects the company from threats. Managers, policymakers, and researchers all recognise the value of digital innovation in fostering competition and economic growth. In an ideal world, digital innovation would increase an organization's operational effectiveness and performance while lowering risk and expenses and providing a competitive advantage (Tiwari and Tripathi 2012). The pervasiveness of digital technology has changed not only how we strategize and organise to create innovation (Lyytinen et al., 2016), but also how we carry out "new combinations of digital and physical components to produce novel products" (Nambisan et al., 2020).Through digital innovation, organisations can improve service effectiveness, operational efficiency, revenue generation, and joint

profit maximisation. Digital innovation extends beyond organisations and industries to include users and consumers because it "is about actively selecting resources of an offering and configuring them with other resources, or even rethinking their usages and purpose" (Henfridsson et al., 2018), which, in turn, generates further digital innovation. Thus, "individuals, groups, or organizations can now co-create services and applications limited only by their own abilities to envision desirable properties" which engenders new and changing behaviors (Tilson et al., 2010). Digital innovation is defined as the use of digital technology to create, adopt, and exploit an inherently unbounded, value-adding novelty (e.g., product, service, process, or business model) in order to improve organisational competitiveness. As technology and knowledge advance, innovation and its management have become increasingly important, and managers must consider this across the entire organisation. The properties of digital technologies have altered the rules of competition in modern organisations. The use of digital innovations can spur innovation in processes, products, and performance. The benefits of digital technologies – the values they provide – and the implementation challenges they face determine their progress. The many advantages of digital transformation as part of digital innovation help businesses automate processes, better utilise organisational assets, and provide more flexibility. There are numerous avenues for future research.

CONCLUSION AND FUTURE DIRECTIONS

Digital innovation is a rapidly growing research field that reflects the deep and widespread effects of digitalization and technological advancement. The characteristics of digital technology alter the competitiveness principles of modern businesses. By encouraging the development of digital innovations, incorporating innovation into stages of production, processes, and products improves results. A significant portion of operational and tactical accomplishments can be replaced by digital transformation, which can be created as a result of implementation. Their growth is determined by the magnitude of the assistances – the value provided – and the barriers to digital technology application. The process of digital transformation has been accelerated by digital innovations that serve as a model for its development. Even though it helps organisations move forward, rapid changes in technologies, their properties, and how they interact as a result of their combination make it difficult to pin down. This work contributes to clarifying and systematically providing an understanding of digital innovation definition from a socio-technical perspective, as well as how digital innovation and digital transformation differ, which we commonly use interchangeably. However, when it comes to digital transformation and innovation, there are still some conceptual issues. Digital innovation and transformation are

complex and chaotic phenomena in traditional product-oriented organisations (El Sawy et al., 2010). Digital innovation is the use of digital technology to create or change market offerings, as well as business models, structures, and processes. Digital transformation refers to the emergent processes of holistic organisational change(s) for value creation and appropriation that are fueled over time by digital innovation initiatives. As a result, this study considers digital transformation to be the sum of digital innovation initiatives based on various digital technologies; in other words, digital innovation is the foundation for long-term digital transformation. Digital innovation is largely driven by collaborations formed externally through digital ecosystems and internally through cross-functional teams.

Traditional businesses, on the other hand, appear to be maintaining their current business models while embracing new digital technologies to improve operational efficiency and productivity. Internal provision of services is preferred when differentiating involves the potential for additional value in the company's operational processes. Various digitalization strategies based on product, process, and organisational, marketing, and technological innovation are available for these processes. However, executives cite rising implementation costs and a scarcity of experts as major roadblocks to digital innovation implementation. By combining their knowledge of technological properties with the needs and strategic management priorities, these experts can benefit from digital innovation. We encourage other researchers to make conceptual and empirical efforts that help to clarify this issue, regardless of our efforts in this article. Finally, business effects such as increased productivity could be investigated to see how beneficial digital innovation would be to the business.

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Chapter 8
Impact of Occupational Stress and Job Burnout on the Health of University Teachers

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ABSTRACT

It is observed that occupational strain and work stress directly affect the well-being of university educators. Burnout is one in which an individual feels an emotional, physical, and mental exhaustion carried by life-threatening and prolonged stress. As the stress continues, they start losing the interest and motivation, and it also causes illness to their body that makes them vulnerable. The authors wanted to present a thorough overview of research that looks at theoretical correlations among stress in addition extra variable quantity towards what remains recognized (in addition what isn't) around the reasons and effects of burnout among university professors, as well as how this connects to burnout theories. These findings repeatedly suggest that undesirable employment characteristics—such as a heavy workload—have a negative impact, and negative work environment, lower salary, and work intensity have a positive correlation with work stress.

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INTRODUCTION

A role model in our lives is someone who stimulates us, pushes us to strive for greatness, and sees the superlative in us. This person might be anyone, but the instructor is the one who leads us in the proper route. Educators have a vital role in nation-building because they remain the ones who produce and nurture talent, and we look to them for guidance and advise on the proper way. A most basic trend we might experience is stress in life's hustling and bustling, for a variety of reasons, the most important of which is professional stress. Stress weakens you mentally and physically to some extent, and there will come a point in your life when you feel yourself falling. According to studies (Sabherwal et al., 2015; Sang and Ved, 2013; Reddy and Poornima, 2012), teaching occupation is too influenced by strain, with a favourable association between occupational stress and professional burnout. Academic stress may be hazardous if your attention is not properly focused on how you will produce and teach information.

Teaching is a difficult job: students and their families have grown increasingly critical and demanding of teachers in recent years; pupils have high expectations, and classes are overcrowded, thus teachers' workload has increased significantly (Lodolo D'Oria et al., 2003).

Stress is a psychological reaction to a change in one's surroundings that is believed to be thought-provoking, bullying, or harmful to one's health. It can cause a number of psychological reactions, with anxiety being the most common. Stress is a phrase that is widely used to describe emotions of tension or tiredness that are commonly associated with job overload or too demanding employment.

One of the top 10 causes of mortality worldwide is stress, according to studies. It can cause a variety of medical and psychological issues to develop. Chronic stress, for example, is thought to have an adverse effect on the immune system by disrupting good immunological responses, and it can also contribute to depression. Stress is so common that it's unavoidable: 74% of individuals have been overwhelmed or unable to manage at some point in their lives.

Freudenberger used the word "burnout" in 1974 to describe an employee's inability to function productively as a result of protracted and substantial job-related stress. Since then, the number of cases of stress and burnout, as well as research into them, has increased, particularly among personnel in the service sector, such as social workers, nurses, teachers, attorneys, medical physicians, and police officers (Dorman, 2003). Maslach and Jackson published the first empirical study on the issue (1981). Burnout is a phenomenon defined by a series of psychological and behavioural symptoms can be bifurcated into three categories: exhaustion, depersonalization, and decreased Personal Accomplishment, according to the research.

Teachers' psychological well-being and anxiety stages are significant characteristics which enable them to be complete teaching supervisors in addition influential. Educators stand at the forefront of the Branch of Education's (DepEd) program, service area, and skill mastery distribution to pupils. Despite the fact that colleges are non-yet organised toward integrate distant education (Asio et al., 2021), education must continue to be delivered. Experts should organise the appropriate training and workshops. As a result, they will be able to provide their finest expertise. When they are placed on the front lines of the system of education, they should recognise their physical, psychological, societal, and well-being, and teaching administrators must confirm that they have the required knowledge, mental perspective, skill improvement, and practical abilities to help students in various fields. They must be mentally healthy in order to impart their expertise to their pupils, and their stress levels must be manageable.

LITERATURE REVIEW

As per an outcome of the recorded works evaluation, it was determined that using SPSS to choose, define, and study research readings in relation to occupational stress, work burnout, and health was credible. To that purpose, an empirical investigation was undertaken using Scholar Google, the Google search engine, the EBSCO database, and the ProQuest database, with the focus on characteristics that explain the names of papers published across numerous databases.

Occupational Stress

Saravanan and MuthuLakshmi (2017), studied on Occupational Stress among Teachers of Higher Secondary Schools in Nagappattinam District indicate that teachers in private school's experience less occupational stress than those in public schools. There is a important gap among government and private higher secondary educators' strain levels. Eres and Atanasoska (2011). Occupational stress of teachers: A comparative study between Turkey and Macedonia says that Turkish teachers are under light stress, while Macedonian teachers are under moderate stress. There is an important difference between Turkish and Macedonian teachers' stress levels. Policymakers should examine the educator training and assessment classification, assuming that individual and societal traits, as well as working situations, may influence teacher stress.

Wu et al., (2006). Intervention on occupational stress among teachers in the middle schools in China indicates that Following intervention, other measures of the work-related questionnaire and the individual strain survey showed substantial

declines, whereas few scales of the individual resources survey and the WAI showed significant increases. According to their findings, treatments were active in dropping work-related stressors, increasing handling resources, as well as enhancing instructors' work performance Hart and Cooper (2002). Towards a more integrative framework for occupational stress specified that it's critical to concentration on worker happiness and organisational performance at the same time. Individual (e.g., behavior and coping) and organisational (e.g., organisational atmosphere in addition work experiences) traits are said to influence these. Winefield and Jarrett (2001). Employees at universities are under a lot of stress in that Academic employees engaged in both teaching and research described the maximum stages of psychological distress in addition the lowest stages of work satisfaction. In general, university staffs expressed a high level of independence and public care from their co-workers. Persons involved in equally education and investigate, on the other hand, reported increased strain as a result of university funding cuts, which resulted in substantial education loads in addition more trouble accessing investigate money, in addition to a decay in education too research resources and care (McGrath et al., 2003). The research of work stress in nursing was part of a larger inter professional study that included nurses, social workers, and teachers. Publishing with the latter two professions, and also inter-professional comparisons, are in the works and this article will focus on the nursing cohort. The study's methodology and procedures are detailed, as well as the demographic features of the nursing sample and their perspectives on nursing. Both professional and personal stressors have been found (Gillespie et al., 2001). Occupational stress in universities: Staff perceptions of the causes, consequences and moderators of stress indicated that during the previous five years, general as well as academic personnel stated a significant rise in strain level. Academic workers reported greater levels of stress on average than non-academic staff. There were five significant stresses identified: inadequate financing in addition equipment, work overload, bad management practises, job instability, and inadequate recognition and motivation. Job-related pressure was cited by the majority of groups as having a negative influence on their professional work and personal lives. The findings offer current insight into the stressors that students face at institutions. Clegg, A. (2001). An overview of the research on job stressors in nursing tells that a number of fields' ontological contributions to the ever-growing collection of information on the topic of stress employee happiness and the influence of workplace culture and inspirational motivation is highlighted in this research, which addresses the complicated subject of stress management (Bliese and Jex, 2002). Conceptual, analytical, and actual consequences of incorporating a multilevel viewpoint into work - related stress research examine that the benefits of adopting a multidimensional approach into the research of occupational stress are illustrated in this essay, which pulls from both of these domains. The writers recognize important

multilevel challenges in work-related anxiety using (a) personal-level analysis, (b) group-level analysis, and (c) cross-level analysis.

Solanki and Mandaviya (2021) in their piece, *Does Gender Matter? Job Stress, Work-Life Balance, Health and Job Satisfaction among University Teachers in India,* examines that workplace stress has a substantially greater effect on women's work-life balance. Additionally, masculine respondents counted more on handling annoyance by work than feminine respondents, indicating a greater separation from their jobs. Amin et al. (2015) in Gujarat, India, intensive care unit (ICU) nurses' stress levels and occupational quality of life the majority of caregivers (91, or 70.5%) have been under moderately severe stress. Occupational value of lifespan dimensions was shown to be linked to stress perception. Domains impacting NICU nurses' professional QOL should be investigated further. Recognizing strain and QOL problems among NICU nurses can aid in the development of appropriate policies.

Job Burnout

Watts and Robertson (2011) examined burnout in university teaching staff: A systematic literature review tell that staff exposure to large groups of students, particularly postgraduate tuition, is a substantial predictor of exhaustion. Additional predicted variables involved gender, through male instructors scoring advanced on the depersonalisation dimension and feminine educators recording higher on the emotive tiredness component. There was also a link between age and emotional tiredness, with younger employees appearing to be more vulnerable. Gaziel (1995) found according to the data, sabbatical leave, work burnout, and turnover intentions amongst teachers a sabbatical combined with professional training had a significant impact on teachers' professional image, as well as their sentiments of work fatigue also intends to authority of their work. Pines (2002) provides a psychodynamic existential viewpoint on teacher burnout is suggested that the qualitative data point to a possible link between important childhood experiences and the decision to become a teacher, as well as between goals and expectations when starting out in the profession and the reasons of burnout. A cross-cultural comparison was conducted using four samples of American instructors (Sarros and Sarros, 1987). According to the research of the predictors of teacher burnout, is caused by organisational issues such as work load, as well as a failure of the job to meet teachers' motivational requirements to remain tested and satisfied by their effort. These findings contradict several well-established research findings while also adding to the increasing body of knowledge on educator burnout.

Mojsa-Kaja et al. (2015) looked at job burnout and engagement among Teachers: Work life domains and personality factors as determinants of work-related relationships that individual factors had a part in the progress of educator exhaustion. Undesirable

reflectivity may remain a major risk for burnout, although self-directness may be protective (Russell et al., 1987). The effects of work-related strain, societal care, and exhaustion on tutorial room instructors were investigated and revealed the occurrence of stressful situations and social support predicted teacher burnout. There was also some evidence of social support's stress-relieving impact (Sak, 2018). Gender gap in Turkish primary child educators' occupation pleasure, fatigue, and organizational pessimism investigate that female and males' instructors have major differences across all three variables in the study, with having greater a significant influence on organizational cynicism and a substantially lower work satisfaction. Furthermore, males had higher job burnout than women. However, in the instance of work satisfaction, these variations were only modest in magnitude, with all other impact sizes being tiny (Lubbadeh, 2020). Work stress: a general works evaluation indicated that the evolution of job burnout is traced in this research. It discusses the causes and consequences of job burnout, as well as prevention and therapeutic measures. It also includes the (MBI), (BM), and (OLBI), which are the three most common methods for measuring job burnout (OLBI).

Yusoff and Khan (2013), stress and burnout in the higher education sector in Pakistan: A organized evaluation of literature say that the study used papers from eight journals and six books from four internet databases to conduct a systematic literature evaluation. It suggests that instructors and administrators should be aware of job stress, burnout, stressors, and coping techniques, as well as develop policies to make the workplace more pleasant (Seidman and Zager, 1991). According to them, research on coping skills and teacher burnout is included in that document. Certain dysfunctional coping mechanisms (for example, excessive alcohol use) remained related with greater levels of pressure and exhaustion, whereas adaptable coping techniques (for example, hobbies) were associated with lower burnout among teachers (Wu, 2020). Work stress is generated by aspects including such job strain, school administration, social environment, economic situation, student pressure, professional progress, and family history, with work intensity becoming the primary inducer; work stress is connected to job burnout and mental well-being. This study lays the theoretical groundwork for protecting teachers' mental health.

Occupational Stress and Job Burnout

According to an article by Li et al. (2015), the interceding activity of mental wealth on the link among work pressure and occupation burnout amongst bank workers in China showed a gender change in the mediator function of mental empowerment on work-related stress-job burnout. In masculine bank staffs, mental wealth found to partly arbitrate the connections among extrinsic hard effort, reward, in addition over-commitment, and the relationship among reward and personal accomplishment; in woman bank staffs, it somewhat arbitrated the relations between extrinsic effort,

recognition, and over-assurance, and the relationship among reward and self-esteem (Wisniewski et al., 1997). Work - related pressure and stress amongst educators: A overview of related works in their study, they examined the stress and burnout research and presented a possible re-conceptualization of a breakdown paradigm.

Rothmann (2008) found job satisfaction, occupational stress, burnout and work engagement as components of work-related wellbeing tells that they backed a four-factor model of work-related happiness variables comprised occupation pleasure (representing desire vs. hate), work-related strain (indicating nervousness vs. comfort), exhaustion (expressing exhaustion against vigour), and involvement (representing motivation against boredom) (indicating enthusiasm vs. depression). Guglielmi, et al. (1998) found work-related stress, exhaustion, and well-being in educators: A organizational and theoretic examination indicated that major challenges to the validity of the findings described include dependence on cross-section retroactive strategies, reliance only on self-report measurements, and disappointment to apply a theoretical conceptual framework for empirical research. Antoniou et al. (2006): Age and gender changes in work pressure and exhaustion among elementary and secondary college instructors within Greece indicate that difficulties with student engagement, absence of inspiration, less achievement, and dealing students through "difficult" behaviour were the most highly ranked sources of stress.

Job Burnout Impacts on Health of University Teachers

Anagnostopoulos, F., & Niakas, D. (2010). Job burnout, health-related quality of life, and illness absenteeism in Greek well-being experts examine that burnout (emotional exhaustion) levels were found to be using logistic regression, significant indicators of short-term (and not long-term) illness absence were identified. Poor physical health may be a predictor of long-term sick leave.

M. Luken and A. Sammons (2016). According to a organized estimation of mindfulness practise for dropping work stress, participants in the research involved healthiness maintenance experts and educators; work-related treatment practitioners were not included in any of the investigations. Six of the eight studies found that mindfulness training reduced job burnout in a statistically meaningful way.

Beheshtifar, M., & Omidvar, A. R. (2013). Causes to create job burnout in organizations tell us the importance of recognising the earliest signs of burnout is critical. Colleagues, bosses, or subordinates may be able to assist an individual in recognising these indicators. What is desirable, however, is for a company to make a continual effort to keep stress in control using a progressive comprehensive programmer and to interfere as needed, using particular protective approaches. R. G. Best, et al., (2005). The investigation of different models revealed that central self-assessments and work stress present understanding of the influence of situational restraints on the appearance of work stress, and the part

of disposition for emotional reactivity, be broadened in order to effectively manage occupational health problems. R. T. Lee et al., (1996). A meta-analytic inspection of the predictors of the three groups of work stress, including how demand and resource correlates, as well as behavioural and attitude correlates, were associated to each of the three dimensions. Emotional weariness was more significantly associated with both demand and resource correlates than depersonalization or personal accomplishment. Emotional weariness was shown to be more strongly connected with request relates than with reserve links, show that employees were concerned about the possibility of resource loss, which is constant with the maintenance of resources hypothesis of anxiety. The three burnout categories were linked to turnover meanings, organisational obligation, and resistor handling in various ways. E. L. Lizano (2015). Investigating the consequences of job stress on the healthiness and well-being of human facility employees: A comprehensive evaluation and synthesis of the negative impacts of exhaustion on employee welfare. Studies in this field remain using the Maslach Burnout Inventory as main amount of stress; they are mainly cross-section in origins, and as a result, they focus specifically on emotive well-being.

Yu, X., Wang, P., Zhai, X., Dai, H., & Yang, Q. (2015). The effect of work stress on job burnout among teachers: The mediating role of self-efficacy the both work stress and self-efficacy was revealed to be substantially associated to job burnout. Self-efficacy, according to structural model, moderated the association among stress and job exhaustion to a certain extent. The result supplemented previous research and providing critical information on by what means to enhance educator psychological well-being.

Effect of Occupational Stress and Job Burnout on Health of University Teachers

Antoniou et al. (2003). The OSI was completed by 193 male and 162 female junior hospital doctors in Greece. JHDs had much greater according to data analysis, the normative group and other matching occupational samples had higher amounts of pressure sources. Bivariate study revealed important modifications among males and females JHDs in two areas of stress ("career and accomplishment" and "home/work interaction").in the various sub-group comparisons. Kind A behaviour and "demands of the profession" were found to be predictive of physical and psychological ill health, as well as work dissatisfaction, in multivariate studies.

Nowrouzi et al. (2015) stated occupational stress management and burnout interventions in nursing and its significance for healthy workplace environment: a review of the interventions studies in this review mostly focused happening individual stress management and burnout therapies in the workplace. Q. H. Lin, et al., (2013), burnout was linked to high occupational stress and low job satisfaction, especially in the emotional exhaustion and depersonalization dimensions, according to the link

between professional strain, burnout, and turnover management personnel from a Sino-Japanese combined undertaking in Guangzhou, China, articulated their goal.

Landsbergis (1988). Work-related stress in well-being care employees: a control examine models for work strains the premise that job strain and burnout are much higher in positions with high workload demands and little decision freedom. After adjusting for age, gender, education, relationship status, children, weekly hours worked, and shift worked, the correlation remained significant. Other employment factors were similarly linked to burnout and pressure. Topf, M. (1989). Behaviour adaptability, job pressure, and exhaustion among serious attention nurses were investigated in a study, the stress-buffering impact of hardiness was not found. That is, a combination of hardiness and occupational stress did not reliably predict burnout in nurses.

De Simone et al. (2016), some of the distinctive perceived occupational obstacles of the Italian educators in our study include job stress, work satisfaction, and physical wellbeing in the burden of teachers, views of the workplace environment, teachers' evaluations of top leadership, and attitude toward change. Work overload as well as attitude toward transformation, in particular, have substantial direct and indirect impacts on physical difficulties, and similarly indirect consequences over work fulfilment. Furthermore, work fulfilment reduces physical difficulties.

To summarize above literature review, Table 1 describes the observed effect of organisational stress, job burnout in relationship with health issues of University teachers.

Figure 1.

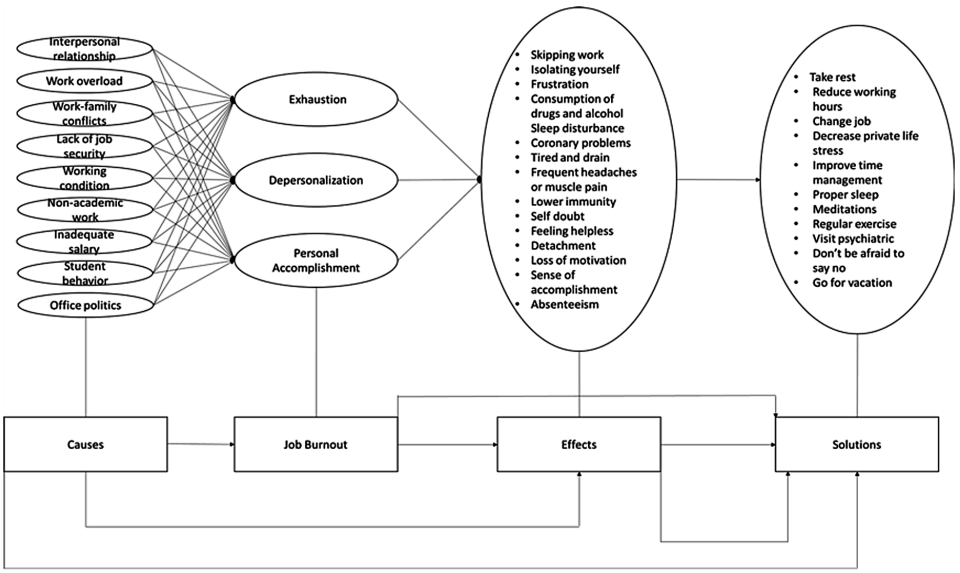

Table 1.

Sr. No.	Categories	Authors' Name	Observed Effects	No. of Papers
1	Occupational Stress	Saravanan, K & MuthuLakshmi, K.	Work Overload, Work-family Conflicts	12
		Eres, F., & Atanasoska, T.	Lack of Job Security, Work-family Conflicts	
		X. Yang, et al.	working condition, Lack of Job Security, Work-family Conflicts	
		J. Li, M. Wang, et al.	Role ambiguity, Role Conflict and Interpersonal relationship	
		Hart, P. M., & Cooper, C. L.	Work life Imbalance and office politics	
		Winefield, A. H., & Jarrett, R.	Work Overload, Work-family Conflicts, Lack of Supervisors' support	
		McGrath, A., Reid, N., & Boore, J.	Emotional Exhaustion and Burnout	
		N. A. Gillespie, et al.	Lack of Engagement & organizational Commitment	
		Clegg, A.	Work Ambiguity and Working environment	
		Bliese, P. D., & Jex, S. M.	Non- academic work and Inadequate salary	
		Solanki, S., & Mandaviya, M.	Office politics and Lack of job security	
		A. A. Amin, et al.	Work overloaded, Work family conflicts	
2	Job Burnout	Watts, J., & Robertson, N.	Uncertain employment expectations and a lack of control	12
		Gaziel, H. H.	Workplace interactions that are dysfunctional	
		Pines, A. M.	Lack of social support and extremes of activity	
		Sarros, J. C., & Sarros, A. M.	Work-life imbalance and long working hours	
		Mojsa-Kaja, et al.	Occupation expectations and Personal expectations	
		Russell, D. W., et al.	Emotional exhaustions and Cynicism	
		Sak, R.	Insufficient Reward and Recognitions	
		Lubbadeh, T.	Lack of Control and Depersonalization	
		Yusoff, R. M., & Khan, F.	Lack of Community and Absence of Fairness	
		Seidman, S. A., & Zager, J.	Conflict in Values and Lack of social support	
		Wu, D.	Work Overload, Work-family Conflicts and Work ambiguity	
		Jiang, et al.	Insufficient Reward and Salary's	

continued on following page

Table 1. Continued

Sr. No.	Categories	Authors' Name	Observed Effects	No. of Papers
3	Occupational Stress > Job Burnout	Li, X., et al.	working condition, Lack of Job Security, Work-family Conflicts	12
		S. Wu, et al.	Emotional exhaustions and Cynicism	
		T. W. Taris, et al.	Excessive activity and a low social support, as well as a work-life balance and lengthy working hours	
		Luo, H., et al.	Lack of Job Security, Work-family Conflicts	
		A. S. Nyssen, et al.	Non- academic work, Inadequate salary, Office politics and Lack of job security	
		Mark, G., & Smith, A. P.	Dysfunctional workplace dynamics	
		Wisniewski, L., & Gargiulo, R. M.	Lack of Control, Depersonalization Emotional exhaustions and Cynicism	
		Rothmann, S.	Work Overload, Work-family Conflicts, Lack of Supervisors' support	
		Guglielmi, R. S., & Tatrow, K.	Insufficient Reward and Recognitions	
		S. Wu, et al.	Work-life imbalance, long working hours, Job expectations and Personal expectations	
		Xie, Z., Wang, A., & Chen, B.	Role ambiguity and Role conflicts	
		Antoniou, A. S., et al.	Inter-personal relationship and Office politics	
4	Job Burnout > Health	Anagnostopoulos, F., & Niakas, D.	Lack of acknowledgment and Job security	12
		Dreison, K. C., et al.	Cardiovascular disease, Seymour and Black muscle pain, decreased fertility, stomach or intestinal problems	
		Luken, M., & Sammons, A.	Increase in Heart Rate and Anxiety	
		Beheshtifar, M., & Omidvar, A. R.	Frequent headache or muscular pain	
		R. G. Best, et al.	Lower immunity and self-doubt	
		K. Shoji, R. et al.	Insomnia, Sadness, anger or irritability	
		J. B. Brookings, et al.	Heart disease, High blood pressure	
		Kim, H. J., et al.	Excessive stress, Fatigue and Vulnerability to illnesses	
		Lee, R. T., et al.	Alcohol or substance misuse	
		Lizano, E. L.	Disconnection and detachment	

continued on following page

Table 1. Continued

Sr. No.	Categories	Authors' Name	Observed Effects	No. of Papers
4	Job Burnout > Health	Deligkaris, P., et al.	Insomnia, chest discomfort, headaches, increased sickness Heart palpitations and shortness of breath	12
		Yu, X., P. Wang, et al.	Sleeping disturbance, Frustrations, feeling helpless and Self doubt	
5	Occupational Stress > Job Burnout > Health Issues	A. S. G. Antoniou, et al.	Lack of Occupation Security, Work-family Conflicts, Emotional exhaustions, Cynicism, Heart disease and High blood pressure	12
		B. Nowrouzi, et al.	Office politics, Lack of job security, Insufficient Reward, Increase in Heart Rate and Anxiety	
		Y. Wang, et al.	Work Overload, Work-family Conflicts Lower immunity and self-doubt	
		Narainsamy, K., & Van Der Westhuizen, S.	Non- academic work, Inadequate salary, Office politics, Lack of job security, Disconnection and detachment	
		Lin, Q. H., et al.	Emotional exhaustions, Cynicism, Insomnia, Sadness, anger or irritability	
		Landsbergis, P. A.	Lack of Control, Depersonalization Emotional exhaustions and Cynicism	
		Oginska-Bulik, N.	Dysfunctional workplace dynamics and sleep disturbance	
		Topf, M.	Exhaustions, frustrations and anger	
		J. K. Khattak, et al.	Work overload, Frequent headache or muscular pain	
		Hansez, I., et al.	Non- academic effort, Inadequate salary, Disconnection and detachment	
		Jorgensen, L. I., & Rothmann, S.	Extremes of activity, Lack of social support and High blood pressure	
		De Simone, S., Cicotto, G., & Lampis, J.	Emotional exhaustions, Cynicism and Insomnia	

CONCEPTUAL MODEL

Getting support from previous literature, following conceptual model is suggested in the current study Figure 1 shows the model and hypothesised linkages that explain the effect of organisational pressure and job exhaustion on the health of college teachers.

CONCLUSION

Globalization and privatisation of education in various nations, including India, has caused higher education to become more competent in order to grow stakeholders with improved information, flexibility, skills, and capabilities, all of which are required for surviving in the world market. As a result, the Indian higher education system saw rapid development, privatisation, marketization, curricular changes, and pedagogical advancements. Universities have faced challenges in terms of the quality learning, a lack of availability of high-calibre faculty, inefficient teaching techniques, an out-of-date curriculums and assessment method, a lack of adequate reading materials, insufficient infrastructure, faulty management, academic staff admission criteria, the incapability to recruit and retain skilled minds, and the lack of an academic achievement conducive environment as a result of these changes. And as the world grew faster due to that the use of technology has also been increase in education sector and continue work with technology also lead to stressful situation for teacher also its give strain to eyes and mental stress is seen in them for making material and presentation for students and the workload also increase for them. Furthermore, the rising significance of cutting-edge learning, abilities, creativity, and investigation in economic progress, as well as the creation of the information era and the need for high-quality education, puts further strain on higher education and, in particular, instructors. The variables, in short, have a harmful effect on the value of our higher education system and produce a variety of stressors and strains in teachers, causing them to perform worse. Continuous stress causes strain, which leads to burnout at work, which leads to job unhappiness. Burnout is seven times more likely in areas of high work stress than in areas of little work-related pressure. Our results show the relationship among work-related pressure and occupation exhaustion, as well as the consequences for health.

Several studies to reduce stress levels, such as the emergence of stress management, such as emotionally intelligent teaching, which enables educators to be self-aware of the skills and abilities required for the variety of roles, duties, and expectations of their work, handle emotional reactions to particular situations, accurately pick up on other human feelings and respond to others' feelings, and comprehend other feelings and emotions. Steel (2001) also advocated for adding in the field of education, organizational support for teachers is provided through monitoring. Additional helping jobs have used supervision to strengthen connections with others and work performance by providing assistance, changing perspectives, controlling emotions, and coping with stressful situations. As a result, educational institutions should treat their staff with more care and attention in order to detect stress signals. Higher management's prompt intervention could prevent further escalation of job-

related issues. A two-way approach should be used by the regulatory organisations. On the one hand, improving educational quality should be a top priority, and new reforms should be implemented to bring value to higher education. On the other side, to prevent burnout and improve job satisfaction and health quality, more attentive observation and proper feedback of teachers should be ensured. Furthermore, regulatory agencies should create new opportunities for career advancement and recompense eligible instructors for their work/research quality. The study's findings and conclusions can be used to improve future models for predicting exhaustion in higher teaching organizations. The findings may also aid in the development of skilled psychological preparation among higher education faculty members in dealing with emotional and motivational contacts popular the work environment.

An importance of organisational strain in addition job stress has piqued an interest in academics and practitioners alike. Given the detrimental consequences of organisational stress and job burnout, teachers' health has been severely harmed. The researcher has created a conceptual model on organisational stress and job burnout in this paper, suggesting a negative association with health problems. The importance of this work is that it provides logical relationships that can be used to generate constructive hypotheses based on actual evidence and to test these theories in the upcoming. Investigators will be able to examine this model in the future, particularly in other industries, to highlight the presence of organisational stress and job burnout. Furthermore, in addition to testing the similar model, researchers can include extra variables such as family support, work-life balance, job overload, and flexible work schedules to make the model more complicated. Furthermore, researchers can test the model using advanced statistical modelling techniques such as SEM and conduct a comparative study across industries.

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Chapter 9
Corporate Sustainability and Internet of Things (IoT):
Benefits, Drawbacks, and Challenges of Internet of Things (IoT) With Corporate Sustainability

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ABSTRACT

The internet of things (IoT) has become a vital component in the effort to achieve net-zero emissions. When it comes to transforming into sustainable resources, the combination of green technology and renewable energy are the reliable resources that are increasingly being acknowledged by global business leaders. The IoT is a trend that is shaping future innovations. Business from every industry is using IoT to create ways for sustainability and to reduce energy waste. IoT projects that are truly transformational can have a significant beneficial influence on sustainability in corporates. The most important purpose of IoT technologies is to make procedures simple in various domains in order to improve the efficiency of the system. Implementation of IoTs in corporates is not easy, but to achieve sustainability targets in business, IoT is a preferred choice. Through this chapter, the author will get to know how IoT technology drives sustainable development in corporate approaches to gaining user trust in internet-connected gadgets with the benefits and drawbacks of IoT.

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INTRODUCTION

Internet of things (IoT) is considered as an opportunity for Industries as it has the potential to provide tremendous benefits by digitizing present and future operations. IoT technologies are becoming increasingly important as a result of ongoing digitalization and present technological advancements, which require a different electronic product to be connected in a way that can be useful. Flexible services and more efficient processes are required to achieved the proper implementation of IoT technologies. IoT technologies have enabled a wide range of services that re efficient enough with smart networking, apps, and devices and can cause beneficial synergistic effects. The networking component of IoT technology is a major advantage that has very high potential.

The basic purpose of Internet of Things (IoT) technologies is to make procedures simpler for various industries, improve their system efficiency on the basis of technology or specialized activities, and at last improve the quality of life. The strong development of IoT technologies is to provide a variety of valuable benefits to the population, but the rapid development with IoT technologies must be properly detect, scan and analysed from an environmental standpoint to put a limit on the presence of detrimental repercussions and to ensure the judicious use of finite worldwide resources (Nižetić et al., 2020).

IoT technologies are now considered as one of the fundamental or basic pillars of the fourth industrial revolution, as it has the potential of innovation and potential to provide societal benefits. On the other hand, each development makes use of finite resources and leaves a variety of environmental footprints (Li et al., 2020). The corporate industries are one of the most important and speedy growing sectors for the development of IoT application (Osterrieder et al., 2019).

There are several critical elements that influence the development of particular IoT application areas, including general advances in electronic components, solutions related to software, and a easily operated user-friendly environment, sensor based technologies and detailed information and data collecting solutions, quality of network, i.e., connectivity of network and infrastructure, adequate supply of energy for IoT based device production as well as their operation.

The use of Internet of Things (IoT) technology in industrial applications has the ability to boost the efficiency of production and can enable more effective networking and communication between the tools or equipment and operators (Nižetić et al., 2020).

The internet of things is in trend due to the eco-system presented in the form of digital sensors, smart devices, and appliances. In the coming years, sustainable development and environmental protection in all industries will be critical for IoT. In the next few years, connected gadgets are expected to be the key drivers of

change with increased demand for IoT from both public and private sectors. New technologies like Artificial Intelligence are emerging to make it more essential and also to make IoT more user-friendly, but there is area where manufacturers will have to work hard i.e., security of devices, the need to secure the connected devices is must as the risk to information and data will increase. Despite all the patterns and projections, the future is still bright and wonderful with IoT, and it is well worth anticipating (Muraleedharan, 2022).

Internet of Things (IoT) is already making a positive influence on development in different sectors like in water management by enabling the understanding of water quality changes and providing variety of distinct sensors and monitoring structures for managing the level of water and warnings of flood or to foresee other diastral activities such as earthquake, land-slides, etc. IoT has also played a developmental role in the agricultural sector by adapting smart agricultural systems, which has gained popularity among the farmers by tracking the content of soil water and nutrients to perform appropriate actions on reported damages and deficiency. In the wildlife sector, IoT has allowed the real time detection of all the animals. In case of any mishappening or disease outbreak, the IoT based device will be useful for controlling, surveying, and preventing disease epidemics in the future. The application *eBird* is also a helpful app for scientists to keep track of birds, their behaviours, and migration patterns. In the case of marine organisms, High-value species like salmon and cod are threatened by overfishing and overexploitation of aquatic variety. *ThisFish* is an online monitoring network in collaboration with local bodies, helps to trace the fish back to the fisherman through GPS readings, inadequate fishing habits can be recognized and stopped this way. For home security and safety purposes, IoT has provided smart home technology with IoT-powered smart home devices in buildings. In the coming days, these devices will become more popular as a part of home automation comfort as well as for security purposes as this type of home sustainability conserves energy while maximizing the usage of renewable sources (Muraleedharan, 2022).

Sustainable developments are not easy to meet, deep learning and the network of communication for next-generation are being used to meet the needs of sustainable development fields such as healthcare with smart devices, agricultural activity management through smart devices, and transportation with smart devices. Sensor based design, delayed communication, and difficulties of security in hardware and software are all challenges for sustainable development. All of these difficulties are mostly addressed from a design and execution standpoint (Maheshwar & Kanagachidambaresan, 2020).

In recent years, a great digitalization has opened up new technical possibilities, which have already begun to alter the sector of majorly economic and the societies in general. Other different sectors have also benefited from digitalization, which

has come up with the new opportunities for advancement and for more efficient use of scarce resources, systems, and procedures. Information technology is also one of the IoT-enabled smart technologies, and also a major driver for systematic digitalization in different sectors. In other words, the energy sector is one of the main industries in which "energy digitalization" has already advanced fast in a variety of energy-related fields (Nižetić et al., 2020).

The major concern associated with the proper adoption of IoT technologies is related to the speed of wireless networks and the coverage of the wireless networks (Wi-Fi). The expectations are high with wireless networks due to substantial gains of its network coverage in the period 2017-2022 as well as and increases in its speed (Gagliordi, 2018). COVID-19 has also pushed the use of linked devices in numerous fields, like smart homes and wearables. Despite the advantages of saving time and providing tailored experiences, these gadgets and the services that go with them require adequate administration (Devi et al., 2021).

To meet the energy demands of IoT manufacturing lines, increased adoption of IoT technology will necessitate a greater reliance on fossil fuel technologies. The limited metals waste and resources, occur due to the manufacturing of electronic equipment, which could become a serious problem in the long term. The percentage of electronic trash recycling is very low (Leblanc, 2020). To ensure more sustainable and balanced growth of IoT technologies, more planned and focused initiatives are needed to be taken in the e-waste management issue.

The world is fast-changing, i.e., technologically advancing, and is being operate by the current worldwide system of economy. Unfortunately, the technological advancement comes with a cost, which may be felt through the intensive use of finite resources that are based on fossil-fuel and the generation of numerous environmental consequences (Chen et al., 2020).

The technological challenges need to be handled to support the fast technical development of IoT devices. Emerging technologies, like the Internet of Things (IoT), virtual reality, and artificial intelligence (AI), are crucial for the organizations to remain economical and sustainable in the long period of time. To achieve the environmental, social, governance (ESG) goals, government authorities acknowledge that corporate must play the key role for the benefit of all. Organizations across industries can adopt IoT to monitor and lessen the risks their products and processes create. IoT drives sustainable innovation and profitability, organizations use the technology to increase energy efficiency. IoT can help businesses achieve sustainability and remain competitive.

Corporate Sustainability and IoT

The invention, plan, and combination of numerous required sensors can be the key characteristics of industrial applications (Li et al., 2020b) to establish integrated

and efficient management systems. The market for linked, electronic gadgets is fast growing: by 2028, the consumer internet of things (CIoT) market is expected to rise from $45 billion to $154 billion, accounting for 60% of all IoT-connected devices (Devi et al., 2021).

To meet the needs of sustainable development miniaturization devices and artificial intelligence is the technology that gives the satisfaction. People's needs are growing at an exponential rate, and meeting them with a generalised structure is a difficult undertaking. The Internet of Things (IoT) allows for more worldliness while using fewer resources (Maheshwar & Kanagachidambaresan, 2020).

The emphasis of digital technology has been taking into a whole new level from previous decade to present during the industry 4.0, thanks to the inter-connection via the Internet of Things (IoT), through which access to real-time data is became easy, and the introduction of cyber-physical systems has been done. The use of IoT in the industry will have a favourable impact on corporate sustainability. Industry 4.0 has an impact on the environment as it is favourably contributing to the reduction of negative environmental effects. Adapting the Industry 4.0 concepts makes energy-based resources more feasible to utilize them more precisely, as the new technologies will be built into the equipment. It has been also discussed that IoT equipment will be smart devices and the ability to optimize the energy consumed by the devices will be added at different stages during the production process (Sartori et al. 2015).

The Decentralised production enabled by Industry 4.0, resulted in a lower in logistical flow, energy, and the consumption of fuel, and hence a reduction in environmental impact. More efficient use of energy-based resources and the raw materials will be possible, resulting in reduced environmental effects from manufacturing operations. Companies will be able to better identify real clients and the quantities ordered will be produced, resulting in a reduced environmental effect. Industry 4.0 will enable "mass customization," which will increase product and service consumption by making them more appealing to customers. However, as a result of the final disposal, there will be additional trash. Also, smart factories, that will be able to receive the personalization demand of each client's and modify them to their required needs (Shafiq et al., 2015).

The 4th industrial revolution (Industry 4.0) has emerged with the Internet of Things (IoT) and Industrial Internet of Things (IIoT). IoT refers to the links that can be found in between the physical items like sensors and machinery and into the Internet. The Industrial Internet of Things (IIoT) is a term that refers to the connections that exist between three parties that is the people, data, and the machines in the context of production. Initially, it was proposed that the adoption of Industry 4.0 concepts and IoT technology would make the manufacturing processes automated, that requiring less workers than traditional industrial processes. It was proposed that Industry 4.0 would allow for a particular set of technological advances, that results

in intelligent or smart factories that requires minimal or no human involvement. There will be the creation and requirement of new high skills set professions that makes its contribution towards corporate sustainability. However, a large number of labours will be harmed as they will be unable to qualify as per the required skillset and in accordance with the modernizing requirements. High Skill Set professions will necessitate the qualified employees and contribution to their professional growth (Kagermann et al., 2013; Hermann et al., 2016; Schwab, 2016).

As a result of Industry 4.0 with the emergence of IoT, robots will be able to perform more dangerous activities for people, reducing the incidence of occupational accidents. Employees will have a better working environment as a result of technological advancements. Because many processes will function using speech recognition and virtual reality, Industry 4.0 will enhance career opportunities for all the professionals with the requirement of special needs, assisting in the integration of persons with special needs into the worker market. Those professionals who are having the intellectual and cognitive skills, as well as the knowledge of multidisciplinary and collaborative ability, will be in high demand.

Sensors in the production and the products will enable the detection of potentially hazardous conditions for humans, hence it is contributing to physical and cognitive comfort design. All value chain activities will be able to be integrated with Industry 4.0. In this way, from under done material supply through finished disposal will be feasible to act collaboratively, allowing for a better study of social, environmental, and economic implications. Industry 4.0 will facilitate the corporate sustainability and the formation of new businesses, which will boost start-ups and small businesses market share. The introduction of new business models with IoT technologies will make industries more sustainable (Siltori et al., 2021).

Digital technologies like the Internet of Things (IoT) have become so prevalent in manufacturing industries and servitization, in recent years the growing research stream has started to focus on "how digital technologies enable service development accompanying in digital servitization (DS)" as a distinct research stream (Paschou et al., 2020; Skylar et al., 2019). The use of digital tools is for the transformational processes, in which the company transforms from a product-centric to a service-centric business model. The logic behind the transformation is referred as DS (Kowalkowski et al., 2017).

More research is needed to ensure the proper implementation of IoT technologies in the industries, as well as for understanding how the IoT technologies should be executed in certain industries so that the advantages could be realized. The progress is critical in terms of connecting various industrial sensors, using and processing the obtained data to enable improved industrial processes, such as IoT smart devices and Computer-Integrated Manufacturing (Chen et al., 2020b). Firms

that want to implement sustainability-oriented DS programmes and Business Model Innovation (BMI) successfully should have and integrate a number of organisational competences, including strategic planning, management of technology, marketing, service innovation, business networking, and stakeholder management (Paiola et al., 2021).

Ways to Use IoT to Achieve Sustainability

1. **Intelligent infrastructures in smart offices:** A smart office makes use of Internet of Things devices to create an "intelligent ecosystem" that leverages connection to control, monitor, manage, and optimize the workplace. Improved productivity and worker safety, more effective corporate operations, more comfortable working environments, and, most importantly for climate change, energy savings are just a few of the benefits of a smart office. Lighting control based on localized motion detection, for example, can result in significant reductions in light consumption and energy efficiency when implemented at scale.
2. **Increasing energy efficiency across industrial sectors:** Organizations in every industry may utilize the Internet of Things to cut carbon emissions and improve energy efficiency without sacrificing productivity. Some energy businesses have created IoT-enabled products and equipment with the goal of increasing energy efficiency. Similar technology can be used in other industrial sectors, such as manufacturing. Within the business model, energy efficiency solutions have a dual purpose. When it comes to ESG supervision, energy-saving makes the firm more sustainable, drives the bottom line, and makes the organization more profitable in the long term.
3. **Smart energy production and consumption:** Smart energy is defined as the "process of using devices for energy-efficiency that focuses on powerful, sustainable renewable energy sources that encourage increased eco-friendliness while driving down costs," according to Smart Energy USA.
4. **Waste Management System:** The major issue of metropolitan regions is inefficient garbage management. Improper trash disposal can cause a number of health risks as well as impact the environment's air and water. With the help of IoT, intelligent trash division and disposal has been developed with machine-to-machine or machine-to-man (M2M) systems. Built-in sensor-based trash systems can be used. The use of such Industrial IoT solutions and devices like built-in sensor-based trash systems for waste management aids in deciding the ideal time to collect trash and determining better routes for collection vehicles dealing with the potential for garbage build-up in cities (Muraleedharan, 2022).

Approaches to Gaining User Trust in Internet-connected Gadgets

People are concerned about security and privacy, according to a global poll conducted by PwC in 2020, yet they often feel imprisoned with their service providers due to a lack of credible options. Businesses can lead by implementing strategic activities that will have a good impact for instance:

- **Create business models that are centred on the customer:** Manufacturers, for example, can use market research, focus groups, and multistakeholder engagement to actively understand a variety of consumer problems before building connected devices and services (including speaking to consumer advocates). To reduce the negative impact on consumers, sellers can implement best practises and standards (for example, when selecting equipment). This can aid in the discovery of new business models as well as the enhancement of brand loyalty and client retention.
- **Perform comprehensive risk evaluations:** This is required to fully comprehend the impact of connected devices on society, the environment, and the economy throughout the product lifespan (pre-market, sales and after-market). Vendors, for example, can see how prolonging product life through repairability and security updates affects customer retention and e-waste. This can assist in differentiating product offers, achieving ESG goals, and attracting new customers.
- **Integrate governance into corporate plans:** Manufacturers, for example, can modify the Trust by Design Guideline, which was established with input from stakeholders from over 100 countries and based on user research and collaboration with IoT manufacturers. This can assist in meeting legal obligations while also lowering future risks and expenditures.

Businesses are simply one piece of the puzzle. To establish a resilient, egalitarian, sustainable, and inclusive future for all, stakeholders across the value chain must act together and assume greater responsibility for Customer IoT adaptation and scaling (Devi et al.,, 2021).

Benefits of Internet of Things (IoT)

There are various useful benefits of IoT technologies that have boosted the overall living quality. It's worth noting that there's no denying that IoT technology brings societal benefits too. IoT technologies are able to affect habits and lives, each technology has its own set of challenges and negative impacts that must be identified

and thoroughly examined as soon as possible (Nižetić et al., 2020). When it comes to IoT technologies, there are a few key points to remember in order to comprehend the long-term consequences of their rapid development.

- The price of electronic device has been decreased, and it resulting in increased in production volume. As a result, the resource of the consumption has been increased. The reduced downtime times has been ensured by autonomously scheduled and regulated maintenance, the supply of raw materials, and other manufacturing requirements, the equipment may have a greater production rate, that resulting in improved profitability. IoT technology-based devices considered as a tool that simplify the process of specific departments of management as well as the entire company structure. (Roznovsky, 2020).
- IoT solutions can automate the routine jobs and also helps in freeing up human resources to focus on more complex tasks that require the personal complex abilities, such as creative problem-solving skills. As a result, the number of employees can be reduced and the corporate cost will automatically reduce (Roznovsky, 2020).
- Using the network-based sensors to automate the schedule that allows the monitoring of resource efficiency at its greatest. Such as, the enhanced power management system and water consumption system, the simple motion detectors can be used for the process and it can save a lot of money of different bills. This process weather it is small or large enterprise, it will be more productive and more environmentally friendly.
- The Internet of Things (IoT) helps businesses by collecting massive volumes of user-specific data that can be utilised to develop corporate strategies. The data can be used to perform marketing and management duties such as for target advertising, for fine-tune pricing policies. Smart home devices are particularly based on voice assistants and other equipment that may interact directly with end-users on a routine basis, this crucial data can be used for business research.
- A company that uses IoT based solutions can offer a wider range of services or goods. Company can also improve the quality of the services or products in comparison to the present competitors while retaining them with same pricing. Smart solutions boost a company's competitiveness and attractiveness as a potential business partner in general.
- The basic and key benefit of smart devices is connectivity, which is automated and have the control over different operations including the tracings, managements of tasks, and inventory management also.
- Using smart devices to collect consumer data allows businesses to obtain a good knowledge of their clients' thoughts based on their behaviour

choices. IoT also helps to improve the customer service by offering post-sale follow-ups such as automatic tracking and reminders of required equipment after a specific timeframe of use, the expiry of guarantee durations, and so on.

- Businesses, Customers, as well as investors who are aware of the numerous advantages provided by the Internet of Things are more likely to prefer a firm that employs high-tech solutions, especially IoT. Furthermore, it is easier to attract extremely professional personnel if a company offers a safer work environment supported by a digital network with smart devices.
- The benefits of using IoT into HR management: HR departments of all the industries are boarding towards the use of IoT in HR management to improve the health of their employees, their safety, and comfort at workplace. The benefits include Improved health and well-being of employees; productivity of the employees can be measured in a number of ways; Obtaining feedback in real time; Increasing the comfort of employees; Payroll processing can be done automatically (Joshi, 2020).

Drawbacks of Internet of Things (IoT)

Experts must develop and deploy IoT solutions in enterprises to ensure that the deployed equipment / software systems are free of faults and very well protected against hacking attempts. Some of the drawback of IoT related to security are:

- The most common problem that can limit the expansion of IoT as a whole is insufficient security procedures. Since intelligent gadgets record and transmit sensitive information, the risk of data leaks is always present, and if that information is revealed, it might have disastrous consequences.
- Alteration of a system features are rare in IoT solutions, as are compliance with the relevant data protection standards, encryption methods, and other rules and technology targeted at preventing unauthorised access to sensitive information. Identity fraud, the loss of company secrets, technology or supplies, destruction, and other costly, horrible, and even lethal consequences might occur from an inability to ensure proper data security.
- Setting up IoT infrastructure in a business means building a vast network with a variety of smart gadgets as well as the technological infrastructure that supports them. As a result, significant resources will be necessary to build, operate, and gradually expand the existing systems to meet future requirements. Despite the multiple perks of IoT solutions, it takes a very long time for them to be profitable, and their financial rewards exceed the cost of adoption.

- While the Internet of Things promises that diverse devices can operate independently, such a system is still heavily dependent on external factors that should be considered when using it in business. Smart devices, first and primarily, necessitate a reliable and sufficient supply of power, demanding the development of very well infrastructure improvements. It should be equipped with a sufficient amount of UPS systems, power strips, and other Internet protocol equipment.
- The Internet of Things' key feature is the vast volume of connections among gadgets and connectivity to the worldwide network. As a result, IoT devices require a network that ensures constant wireless network communication, as well as high flow capability, reduced latency, and constant Internet service. A corporation must initially provide all essential network services, such as cabling, router, ports, and local storage devices, in order to take use of IoT.
- For IoT technology solutions, competent, skilled workers with a clear awareness of the scope and possible consequences of their activity are necessary. In order to install, established, manage, and change the scale of IoT systems in a corporate company, highly skilled authorities are required, which might be difficult to recruit and hire due to the high salary they demand. All employees who will be working with the smart network device should receive thorough training and specific directions. While the Internet of Things reduces the need for human capital, those who remained must be well-trained to prevent disturbing smart device operations and producing the "snowball effect."

Role of IoT to Enhance Sustainability

More persuasive solutions are needed for sustainable business operation as these solutions are required to stand with change and development. Emergence of IoT has connected the objects through devices with existing network systems and these innovations are aiming towards the sustainable change. The role of IoT towards enhancing the development of solutions for the three pillars of sustainability, i.e; social, economic and environmental perspectives (Nasiri et al., 2017) that will help in corporate sustainability.

1. Role of IoT to enhance Social Sustainability: In terms of social perspective, IoT improves the living standards, increase safety and security, and help to enhance the education system. Additionally, in medical sector early diagnosis of serious health issues and smart therapies will be there. These principles will lead to value added jobs and less social problems (Nasiri et al., 2017) that will lead to corporate sustainability.

2. Role of IoT to enhance Economic Sustainability: From economic standpoint, IoT enable remote monitoring of gadgets, unique services, intelligent products and new production methods are among the values which create in industrial IoT (Nasiri et al., 2017).
3. Role of IoT to enhance Environmental Sustainability: As per the environmental aspects of sustainability, it creates the opportunity of conserving energy and reduce the needs for natural resources. These solutions offer the chance for business and industries to grow economically. Also, these solutions enable and facilitate people to live a safe and environmental friendly life while enhancing the social and environmental sustainability (Nasiri et al., 2017).

Challenges Associated With IoT

Each rapidly emerging technology has its own set of potential drawbacks that must be carefully considered examined and handled. As the number of IoT devices is in the billions, and they have such a big potential impact on the population, special difficulties must be addressed, as identified by the review undertaken here. The major goal is to ensure that IoT technologies develop in a sustainable and balanced manner (Nižetić et al., 2020). As a result, the following challenges are briefly described below and should be carefully examined as IoT technologies evolve further:

- Minimizing the energy consumption in IoT devices is a critical task, to achieve this goal lowering the energy supply is required.
- As a result of IoT technology in some sectors may results in less manpower requirements and may reduce the direct social contacts. In this context, IoT technology should be used with caution assessed in light of the challenges stated.
- The fast adoption of IoT technologies has resulted in a strong demand for raw materials used in the production of various electronic devices, gadgets, and some of these materials are very rare and due to high demand, they are becoming rarer.
- Due to the rise of IoT gadgets in Corporate and other industries, electronic waste is becoming the primary challenges. To deal with this challenge, the rate of recycling system must be increased, and better e-waste management system must be developed.
- It is also necessary to continue developing sensing technologies with improved data collecting systems.

- The long-term impacts of IoT technologies, as well as their sustainability, are unclear and they are understudied. Operating IoT devices will require a significant amount of energy, and the electronic industry leaves a variety of negative environmental imprints that must be carefully investigated.
- There must be major breakthroughs in both individual electronic components and user-friendly software solutions.
- An affected potentially big population makes electronic gadgets more economically acceptable. High production quantities will be projected to satisfy the huge need, which could lead to a rebound effect and unnecessarily quick use of limited resources that are available.

CONCLUSION

In recent years, intense digitalization has opened up new technical possibilities, which have already begun to alter the major economic sectors and societies in general. Digitalization opened up new opportunities for advancement and more efficient use of limited resources, systems, and processes in several economic sectors. Information technology, that is IoT-enabled smart technologies, are the driver for efficient digitalization in different sectors. The energy sector is the fastest-growing application part for IoT technologies.

New technologies, such as Artificial Intelligence, are surfacing to make IoT more natural and adaptive for users, but for this manufacturer will have to work harder to safeguard their devices connections as the risk to the data will grow. Despite all of these movement and forecasts, the future is bright and favourable, and it is definitely worth looking forward too.

IoT is without a doubt, one of the most intriguing digital technologies, it will certainly increase in popularity and use in the coming years. IoT systems' potential are extraordinary, and potential benefits are enticing even in their current state. However, it is critical to understand that implementing IoT into a business requires a considerable amount of time and work in order to get the benefits while eliminating the disadvantages. The most practical course of action for achieving an effective IoT solution is to enlist the assistance of qualified and experienced professionals.

The use of Internet of Things (IoT) technology in industrial applications has the ability to improve the efficiency and capability of production, which can positively impact the sustainability of the industry. It has been also observed that to meet the needs of sustainable development, small sized devices like miniaturization devices based on artificial intelligence will be needed for the proper satisfaction.

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Chapter 10
Digital Diversification and the Use of New Age Technologies on FinTech Firms

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ABSTRACT

FinTech firms and innovative financial service providers are delivering a wide range of new financial products, financial businesses, financial software, and novel forms of customer communication and interaction. As a result, a study on new business models and technological applications can aid in examining changes and the effects of technological advancement on the financial industry. The study aims to review the current state of the Indian financial technology market and addresses the technological changes with its application in different FinTech segment. It also provides an outlook on potential future trend in the FinTech market in India. Therefore, this chapter offers a coherent research theme formulated through systematic literature review and industrial report data. The study found that financial service innovation needs to be understood under the convergence of new age technology. Additionally, account aggregator, embedded services, and neo banks are the trends coming up in the Indian FinTech market.

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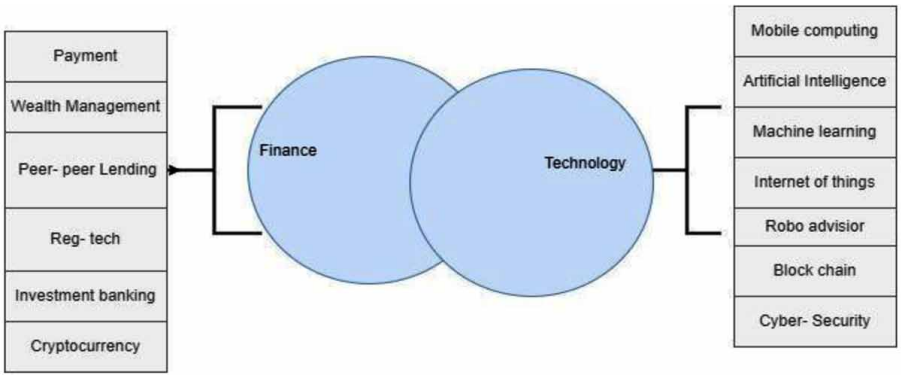
INTRODUCTION

In 1972, a banker from New York first used the phrase "FinTech." Although the meaning of the term "FinTech" lacks a generally recognised definition of financial technology. The term "FinTech," or "financial technology," describes a business that combines the newest technological trends to offer its clients better financial solutions in the form of digital payments and transactions (Rajeswari & Vijai, 2021). It refers to any business that engages in price options, online market lending, mobile apps, financing, foreign exchange and remittances, investments, distributed ledger technology, virtual currencies, mobile wallets, artificial intelligence, robotics in finance, crowdsourcing, insurance, and wealth management. By enabling real-time financial control for the community, it has the potential to be advantageous (Brainard, 2016).

It is a new technical term that is supported by numerous cutting-edge technologies and describes a collection of novel business strategies and technical innovations that profoundly alter how financial services are provided in the present scenario. As per Statista (2022), the United States had 10,755 fintech (financial technology) start-ups as of November 2021. In comparison, the EMEA region (Europe, the Middle East, and Africa) had 9,323 such start-ups and the Asia Pacific region had 6,268. Further IAMAI, (2017) Report emphasised the fact that traditionally, financial institutions were viewing technology as an enabler to business propositions, on the other hand, Fintech are changing that role by leveraging digital technologies to create new business propositions and target new market segments that were previously unattainable.

FinTech refers to the development and successful implementation of innovative technology instruments to meet users' financial needs and demands. It goes beyond e-banking and consumer digitalization. It has been fascinating to follow India's

Figure 1.
Source: Author compilation



transition from online banking (which primarily covered core services) to digital banking, which involves automating all banking services using a variety of digital platforms. The fintech mechanism involves BaaS (Banking as a Service), a platform that links banks and third-party APIs so that the latter can provide cutting-edge financial services through a network of fin-tech partners or developers. As a result, along with more conventional tools like banking cards, USSD, mobile banking, and POS terminals, the experience of digital banking has been improved by Open-API like Aadhaar Enabled Payment System (AEPS), Unified Payments Interface (UPI), and Mobile Wallets. Additionally, the growth in the Fin-Tech market can be addressed by explaining, emerging technologies that present a clear opportunity to accelerate the financial industry's transformation by providing greater value to users, increasing operational efficiency, lowering operating costs, disrupting existing industry structures, and democratising financial services access (Belanche et al., 2019).

In India, Fin-Tech firms are using Account Aggregator (AA) or Open Banking Framework. This framework offers a digital platform for the simple exchange and consumption of data and information from financial information providers (FIP) like banks, mutual funds, insurance companies, tax/GST platforms, and similar entities for the benefit of financial information users (FIU) like personal financial managers, wealth managers, and Robo advisors, as well as from credit providers (banks, other lenders, etc.), credit providers, and credit rating agencies, and similar entities. Further, AA only shares specific customer data with FIU with their consent for a specific period of time and does not store their customers' data while maintaining the highest level of data protection, data blindness, and other security concerns.

However, despite the opportunities derived from the launching of FinTech, research on new age technologies and the fintech segment is limited. Most studies in this area have focused on particular technology implementations in Fin-tech ignoring the overall role of technologies in different segments of fintech universe. Nonetheless, given the potential for widespread adoption of new age technologies (artificial intelligence, machine learning, block chain, robo advisory, virtual reality, and artificial reality) in the finance industry, a comprehensive model that better explains the key technologies available and their implementation in the finance industry is required. To do so, this overview article aims to structure this relatively new field and to conduct a systematic review of existing academic literature. Further, the chapter intends to concentrate on India's fintech landscape. It will concentrate on the potential effects of financial technology in the Indian financial market and how India has changed in recent years as a result of the disruption caused by new technologies.

The study's main research directions include the Fintech business segment and technological sub-categorization. In addition, a discussion of future research directions

based on this sub-categorization and the identified research gaps is also provided. The purpose of this discussion is to contribute to the literature by providing details on the Indian fin-tech landscape and technological changes in the financial market.

LITERATURE REVIEW

Evolution of Fin-Tech

The emergence of technology start-ups in the financial domain started after the 2008 financial crisis with the premise of operating with complete trust and transparency. These companies that started disrupting the financial services business domains were primarily technology companies and were therefore collectively referred to as Fin-Techs (Lee & Shin, 2018). Fin-Techs by the very nature of their formation were agile, asset-light and disruptive in nature. The FinTech revolution started in the United States and soon spread to the UK and other European countries. The reasons for the emergence and success of these Fin-Techs have been the same across these countries. Some of the common reasons for the rise of Fin-Techs in these countries have been the financial crisis of 2008, better customer experience from Fin-Techs and an alternative, yet affordable, business model from them (Broby, 2021). Other countries, like India and China, started their own FinTech revolution, though the reasons were more focused on financial inclusion and a better customer experience. Fin-Techs also soon started emerging in African nations to solve some of the financial inclusion problems by introducing alternate currencies like mobile money and Bitcoins. Fin-techs in African countries have also been pioneers in using blockchain for cross-border transactions.

Previous Studies on Technologies and Fin-Tech

Block chain technology, social networks, artificial Intelligence (AI), machine learning (ML), robo advisor, Internet of things, near field communication (NFC), peer-to-peer technologies, big data analytics, and the development of technological enablers such as mobile devices, intuitive user interfaces, and security technologies are among the key technologies and concepts driving recent changes and developments in the financial market (Gomber et al., 2017). From a theoretical perspective, Huang and Rust (2018) described AI as a major source of innovation that will gradually replace human jobs in the future. Further, Belanche et al., (2019) study on AI and robo advisor implementation in fin-tech emphasised the fact that with its new developments and methods for facilitating easier access and comforts for individual users, AI truly shines in the current environment. According to Van Doorn et al. (2017), the degree

of human and automated social presence in customer service interactions will depend on the ability of frontline robots to engage clients on a personal level. Overall, there is a growing understanding of the necessity for businesses to implement new age technologies to advance their management practices and product offerings (Han and Yang, 2018). By doing this, businesses can gain a competitive edge and more effectively adjust to a short- and medium-term market transformation (Grout, 2021; Qi & Xiao, 2018; Vadlamudi, 2020).

The phenomenon of unprecedented growth in technological changes across fintech is having a critical impact on the economic, social and labour domains (Acemoglu and Restrepo, 2017). Furthermore, literature reveals that with the advancement of technologies and the availability of opportunities in the market, development in the fintech market can contribute to the overall growth of the economy. Despite the increasing interest in this phenomenon, literature on collective technology use in fin-tech and the Indian Fin-tech market is currently scarce and has frequently been focused on opportunities and challenges faced by Fintech firms (Broby, 2021; Lee & Shin, 2018; Mahmood et al., 2021; Perkins, 2020; Vijai, 2019). A few recent studies on the role of technology such as AI, ML, IoT, robo advisors, and big analytics in the growth of the fintech market have described widespread adoption of that technology in financial service implementation. So, from a more technical standpoint, this study attempts to present conceptual knowledge of technologies and their application in financial services, as well as how India has embraced change in the financial market by addressing emerging trends and challenges faced by fin-tech firms.

AN OVERVIEW ON EMERGING FIN-TECH MARKET

The number of players in the fintech industry has increased exponentially over the last decade. These could be start-ups, investor teams, venture capitalists, and accelerators that are new to the industry. The global Fintech market is expected to be worth USD 460 billion by 2025 (Global Fintech, 2019-2025). This is due to the increasing adoption of mobile and technology-based solutions. Banks and other financial institutions are heavily investing in technology-based solutions in order to compete with modern fintech firms. (2022) presents a region-wide distribution of fintech start-up and found that Americas being pioneer with 10,755 start-ups in 2021, followed by EMEA (Europe, The Middle East and Africa) and APAC (Asia-pacific region). The importance of investing in the fintech industry has increased recently. Fintech investments reached a record high of approximately 112 billion dollars globally in 2018, setting a new high for the industry (Vijai, 2019). India is becoming more competitive, offering a platform for fintech start-ups to grow into unicorns with billion-dollar valuations in the future. The Growth in fintech firms

can be seen with the increase of internet Penetration in Indian market. Internet penetration has reached to 61% in India and Fin-Tech has expected to grow at CAGR of 31% during 2021-2025 (Singh, 2022). The increase in venture capitalist investment, the increased level of recognition of the crypto market, the growing interest in data connectivity, and the increase in cross-border merger and acquisition activity, increase in cyber-security investment, all contribute to the growth of the Fin-Tech market in India. Also, KPMG Report, (2022) confirms Lending segment as a most confirms payment as most growing Fintech segment and Insur-Tech as the segment showing more growth potential in future.

Fintech Segment

As per the Deloitte Report (2017) on Indian fintech. FinTech can be broadly aligned across the following financial services areas. These are described in Table 1.

Fin-Tech Trend Shaping the Future of India

Fin-Tech market has marked a significant increase in investment and investor interest. Its scope is expanding far beyond its original definition in many parts of the world. fintech subsectors, rising investment in less developed jurisdictions and surging corporate interest are some of the factors contributing to boosting the fintech market's expansion. The future trend in the fintech market is summarised in the following section:

Emergence of Super App as a Financial Service Enabler

Super apps consolidate a variety of services under a single roof to facilitate multiple daily use cases. The Indian market for super apps is gaining popularity. with increasing levels of digitization, more affordable smartphones, and a COVID-induced preference for digital services. Notably, big technology companies such as Google, Amazon, and WhatsApp have modified their offerings to provide specific services such as Google Pay, Amazon Pay, and WhatsApp Payments.

Neo Banking: A Concept of Digital Only Banks

Neo banks are ones that have no physical presence yet offers banking like services. As per KPMG Report, (2022), venture capital and private equity investors have begun to invest heavily in Neo-banking start-ups. So far, Indian Neo banks have raised approximately USD 230 million. Based on financial service offerings, Neo Banks are divided into 3 types. First is Digital only banks with fully operational

Table 1. Fintech financial service area

Area	Fintech	A Brief Summary
Borrowing	Crowd- funding	Crowd- funding is a method of raising money from a large number of investors.
	Peer to peer lending	Peer to peer lending is a type of lending where people lend to each other.
	Loans Marketplace or online lender	acquiring customers online.
	Credit scoring platforms	acquiring customers through alternative scoring and digital channels.
Payments	Mobile Wallets	Services that allow for the transfer of funds for a variety of purposes.
	Cryptocurrency	Block- chain based peer to peer network of digital currency
	PoS service	
Wealth management	Robo Advisors	Technology-governed investment strategies are used to deliver wealth advisory services.
	Algorithm trading	
	An online financial advisor	
Personal financial planning	Tax management	Resources and services for actively managing personal financial profiles (e.g., spending, investing, credit profile, etc.)
	Spend analyzer	
	Credit scoring services	
Reg- tech	GRC (governance, risk and compliance) platforms	It helps operationalize compliance and oftenhouses all of a firm's regulatory information, including obligations, controls, policies and procedures.
	Regulatory knowledge automation	is technology that bridges the gap between the raw data of regulatory content and actionable insight
	Regulatory content tools	are situated at the beginning of the compliance process.
Bank- Tech	Block- chain	Using block chain as a database for registering a transaction
	Big- data	Services that use a variety of data points, such as financial transactions and spending patterns, to create a customer's risk profile. This is a viable alternative to traditional underwriting method.
	AI and ML	Use of artificial intelligence and machine learning in fraud detection and providing customized solutions to customers.
InsurTech	Insurance aggregator	Providing a customized insurance policy as per the usage and stored data study.
	Internet of things	

licencing (Not granted yet by RBI), Over the top banks that include standalone digital platforms offering various basket of products with their partnership with Banks, FIs and other fintech firms and finally Digital-only Brands created by traditional banks having their own separate identity, mainly focusing on younger millennial. In India, some of the predominant players of Digital only brands are YONO (by SBI), Digi bank (by DBS bank) and Kotak 811 (by Kotak bank).

Rise in Embedded Banking and Embedded Solution Providers

Embedded financing (Emfi) is a concept that enables non-financial entities to integrate financial services and products into their own platforms. Here, the main goal is to make it possible for non-financial organizations to integrate financial services using APIs, preventing customers from having to visit a different website to access financial services. Embedded finance can take many different forms. It includes integrated insurance and the Buy Now Pay Later (BNPL) trend that is becoming more popular across online retail platforms are all constituting different forms of embedded services. One well-known and frequently used type of embedded finance is the integration of payment systems. This would include things like UPI, an e-wallet integrated into an e-commerce platform.

Account Aggregator Network: A Financial Data-sharing System

The Account Aggregator (AA) network, a system for sharing financial data that has the potential to transform credit and investing by giving millions of consumers access to and control over their financial records and increasing the potential market for lenders and fintech firms. This is the first step toward opening up banking in India and giving millions of customers the ability to securely access and share their financial data online with other institutions. An individual can securely and digitally access and share information from one financial institution with which they have an account to any other regulated financial institution in the AA network with the aid of an Account Aggregator (AA), a specific category of RBI-regulated entity (with an NBFC-AA licence). Eight of the biggest banks in India are the founding members of the account aggregator system in banking. The Account Aggregator system can significantly speed up and reduce the cost of lending and wealth management (PIB, 2021).

CHALLENGES AFFECTING FIN-TECH ADOPTION IN INDIA

Bridging the gap between machine and human decision models is one of the main challenges in the Fin-Tech environment. A data-driven environment is quickly

taking over the global economy, disrupting a wide range of industries. A number of developments pose a threat to established traditional financial firms. The widespread use of robo-advisors, or automated financial planning systems, will put pressure on human advisors to reduce their rates and offer more services, even to those with modest means. However, current robo systems are barely noticed under asset management systems, but new technologies have potential to grow. Also, Fin-Tech firms are facing design adaptive challenges for sustainable development and meeting the needs of changing economic conditions due to political and economic upheavals.

FINANCIAL SERVICES AND TECHNOLOGY CONVERGENCE

Big Data

In finance, big data refers to the petabytes of structured and unstructured data that banks and financial institutions can use to forecast customer behaviour and develop strategies. The financial industry generates a lot of data. Structured data is information that is kept within a company and is used to make critical decisions. Unstructured data is accumulating in ever-increasing amounts from a variety of sources, providing significant analytical potential. As the Internet of Things (IoT), mobile technology, and improved authentication mechanisms become available, the value of big data will rise. As a result, fintech companies will continue to invest heavily in data science departments so that they can concentrate on data collection and processing. As a result, previously unbanked and underserved groups now have access to new financing options (Day et al., 2018; Kushwaha et al., 2021; Majeed et al., 2021). Customer experience has become a differentiator and a major influencer of customer expectations. As a result, fintech has been able to steal customers away

Figure 2. Benefits of big data in financial sector

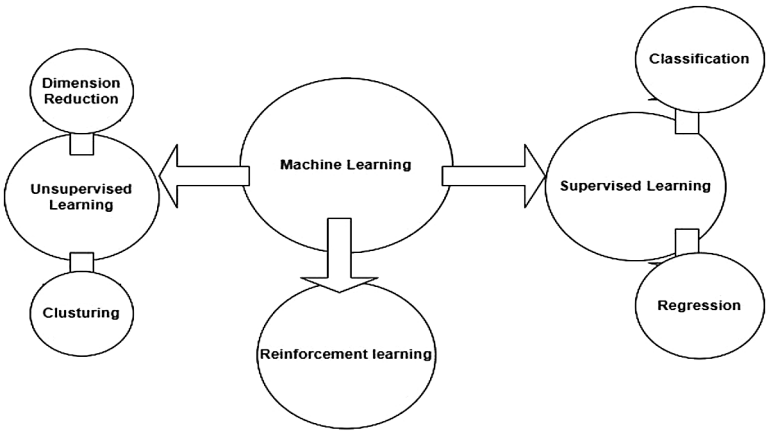
from traditional financial institutions. According to industry analysts, one of the reasons for the growing acceptance of fintech businesses and non-traditional financial institutions is the improved client experience.

Big data drive benefits in the area of customer orientation. That, while fraud is a common issue in the digital banking industry, big data can help fintech companies develop accurate fraud detection systems by detecting any unusual transactions. FinTech's may also use digital applications to keep customers informed about security issues and to keep their money safe. can be used to create detailed user profiles and precise client segmentation strategies, allowing businesses to tailor their services to their specific needs.

DEEP LEARNING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING) IN FINTECH

In the field of artificial intelligence, deep learning is a subset of machine learning. Deep learning allows computational models to extract higher levels of abstraction by combining multiple processing layers. Deep artificial neural networks have demonstrated their effectiveness in pattern recognition, speech recognition, and natural language processing in recent years. Artificial intelligence (AI) and machine learning (ML) are two terms that are used to describe the use of computers to perform tasks that are traditionally associated with intelligent beings. The use of AI in financial markets is increasing, and this trend will continue on many aspects of the industry. AI have potential effect on competition in financial market (Fmkt). There is a widespread belief that machine learning will cut prices, that innovative financial companies will provide strong competition to more traditional players, and that as a result, financial markets will become more competitive, lowering consumer prices. AI-based chatbots will develop further and give customers a more tailored experience when they shop for financial services and goods. d. Additionally, AI and ML tools will become more prevalent in background checks and risk assessments of businesses. There is a significant literature that indicates that the use of ML in credit markets helps reduce the risk of a debt book (Iyer et al, (2015); Dorfleitner et al. (2016); Flowcast. ai (2018); Jagtiani and Lemieux (2018); Berg et al. (2019); Frost et al. (2019; Gambacorta et al. 2019). Indeed, it is hoped that the ability of ML techniques to better distinguish lowesr-risk borrowers from apparently similar but more risky borrowers will be one of the great benefits. The central point that emerges from this subsection is that the impact of ML on com- petition and repayment rates in the market is likely to depend critically on what the ML technology can improve.

Figure 3. Machine learning techniques

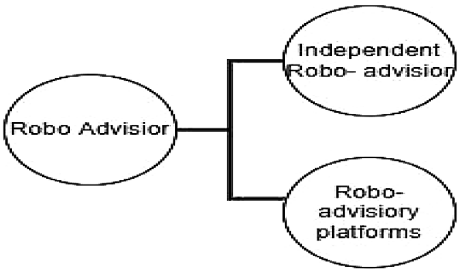


What may appear small differences (e.g. whether ML resolves asymmetries by reducing moral hazard or by enabling better identification of project risk) can lead to very different outcomes. Hence, a view that ML will always foster greater competition and lower prices in a market is likely to be misplaced, and when it does and does not may be sensitive to small differences. It is worth pointing out that the ability of ML to reduce competition and raise prices is also known when algorithms are applied to price setting in output markets. Calvano et al. (2019) and Assad et al. (2021, this issue) discuss this problem and its implications. Figure 2 explains different technique used by

Robo Advisor and Wealth Management

Phoon & Koh, (2018) explained that the current generation of robo-advisors focuses on asset allocation and implementation and generally offers passive investment strategies. Simple surveys are used to assess client needs in client profiling. In general, asset allocation and rebalancing are not rigorous. Robo-advisors, on the other hand, provide quick and easy account opening and asset transfer for management. Robo-advisors also charge a lower fee for their services. Current robo-advisors, on the other hand, are unlikely to meet the needs of sophisticated investors with even moderately complex financial requirements. Through the extensive use of robo advisor, investor would be able to select investment opportunities with the help of software that can help in eliminating human biasness and emotion in selecting the best alternative for wealth management (Day et al., 2018). Further, Phoon & Koh, (2018) described two types of robo advisor explained in figure 4.

Figure 4. Types of robo advisor



Internet of Things

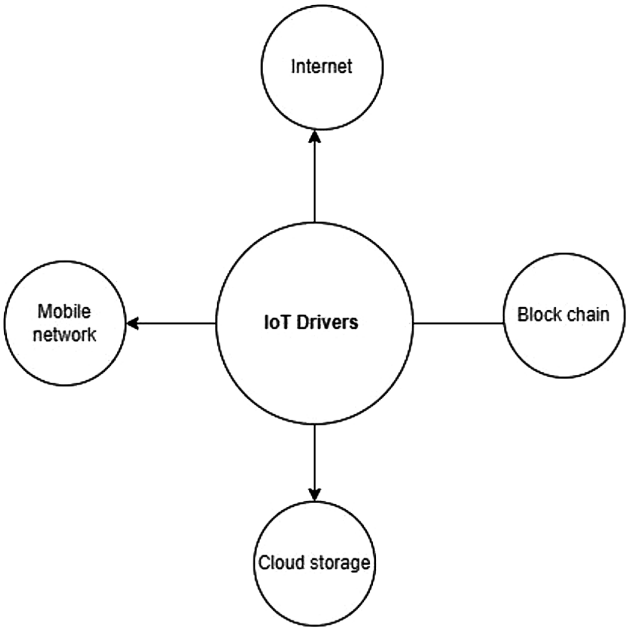
Internet of things (IoT) and its implication in financial sector is not new. Maiti & Ghosh, (2021) addressed the trend in use of IoT in financial sector with the help of BOT (Behaviour over time), where it was found that over the time, as development in the fields of IoT and Fintech progresses, the opportunity and challenges associated with IoT and Fintech grow. Mobiles, scanners, sensors, cameras, and other IoT devices are used by BFSI organisations in a variety of ways, ranging from low computing to high computing. The cost of such devices is steadily decreasing as their quality improves and they become more widely available. IoT devices are in high demand, especially among BFSIs, due to their scalability and cost savings. Maiti & Ghosh, (2021) has also tried to identify he major driver behind the implementation of IoT wearable in financial sector and presented in Figure 5.

Blockchain and Digital Currency

Blockchain is said to have the potential to change the nature of investment and disrupt the global financial system (Wamba et al., 2019). In 2008, a person (or group of people) known as Satoshi Nakamoto created the first blockchain (Nakamoto, 2008). This concept was implemented as a core component of the cryptocurrency Bitcoin in January 2009. Bitcoin became the first digital currency without the need for a trusted authority thanks to the use of a blockchain.

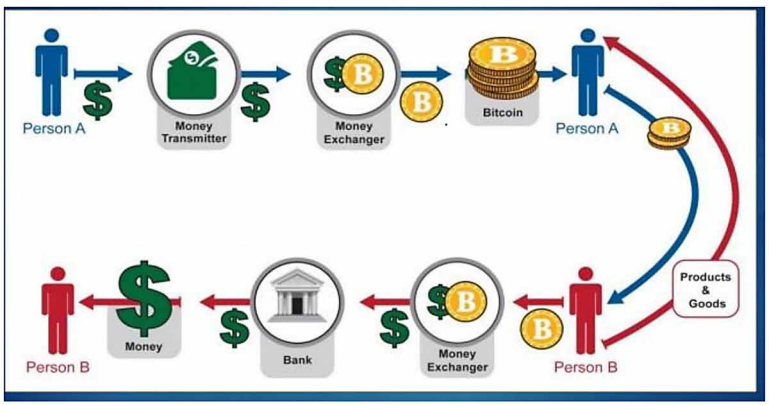
Blockchain is not the first to propose a peer-to-peer network that transfers value between participants. Bitcoin transaction data is permanently recorded in a block, and this is added to previous transaction records (therefore forming a blockchain) Casino et al., (2016). Users can validate and track their Bitcoin transactions using the blockchain, and the stored information within the block can act as a trust element. As a result, a blockchain effectively eliminates the requirement for a centralised agent, which is typically provided by financial intermediaries. Because of the inherent

Figure 5. Drivers of IoT



trust element in blockchain, it has the potential to be a transformative technology in financial services; in some cases, it may even eliminate the need for intermediaries (Figure 6). Further some studies have identified various other domain where block chain technology can work for innovation (Giudici et al., 2019; Maiti & Ghosh, 2021; Wamba et al., 2019).

Figure 6. Mechanism of Bitcoin
(Source: Bitcoin)



CONCLUSION

FinTech refers to financial sector digital innovations and technology-enabled business model innovations. The objective of the study was to find out the technologies convergence in financial sector and describing the landscape of Indian Fin-Tech market. Firstly, the study found that financial service innovation needs to be understood under the convergence of new age technology financial service innovation needs to be understood under the convergence of new age technology, which are likely to replace human jobs (mechanical, analytical and intuitive) in the coming year. Further, it has also highlighted that this advance represents a disruptive innovation that companies need to carefully understand and integrate in order to achieve a successful transformation in the medium term (Belanche et al., 2019). Further, the study contributes to the literature by describing link between the financial services and new age technologies being adopted.

Secondly, the study contributes in addressing fin-Tech landscape in India and found that with the help of Government reforms and application of new age technologies, Indian Fin-Tech market can contribute largely in overall development of the country. The concept of Neo Banks, Account aggregator model and embedded services are the key trend coming in Indian Fin-tech market. Also, Fin-Tech firms in India are facing certain challenges. Where, Bridging the gap between machine and human decision models is one of the main challenges identified in the Fin-Tech environment.

The scope of chapter is limited to implication of technology in financial sector and has not incorporated the effect of adopting this technology on the delivery of financial services i.e., customer perception and orientation. The role of financial intermediaries, and how this role might be changed, thus can make a more fundamental area of future research.

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Chapter 11
Digital Transformation and Innovation Management:
A Systematic Literature Review

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ABSTRACT

Digital innovation is the creation and commercialization of novel products and services while digital transformation indicates the combined effects of several digital innovations by novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace, or complement existing rules of the game within organizations and fields. Since innovation processes themselves are subject to digitization, scholars have argued that accepted theories of innovation are no longer applicable, and hence, there is a significant need for novel theorizing and empirical research on digital innovation management.

INTRODUCTION

Digital technologies are impacting all aspects of economic and social activities by disrupting or complementing existing activities or creation of new activities, services, and businesses. Digitalization allows automation and tracking and storing of information and data which can be analysed for improving processes,

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work organization (Zuboff, 1988) and predict future events (Agrawal, Gans, and Goldfarb 2018). Some of the high impact digital technologies are internet of things, blockchains, additive manufacturing, big data, and artificial intelligence; cloud computing, and augmented and virtual reality (Rindfleisch et al., 2017). Digital innovation is the creation and commercialization of novel products and services while digital transformation indicates the combined effects of several digital innovations by novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations and fields (Hinings et al., 2019).

In order to leverage the complex and dialectical relationships between innovation, digital technologies, the relationship between evolution and trajectories of connected digital technologies and firm innovation needs to be understood. Innovation is a result as well as a source of digital transformations at all levels.

Digital technologies are continuously improving through higher processing capacity and lower cost enabling new opportunities for networks to generate, develop, and fund innovative digital products and services (Yoo, 2010). The unique characteristics of digital innovation processes make it mandatory for firms to evaluate the role and configuration of their product and service portfolio, their interaction with the digital environment, and how organizational processes can be configured to support digital technology driven innovation.

Since Innovation processes themselves are subject to digitization, scholars have argued for newer theories as existing assumptions and perspectives may no longer be relevant (Nambisan, Lyytinen, Majchrzak, & Song, 2017; Svahn, Mathiassen, & Lindgren, 2017). Hence there is a significant need for novel theorizing and empirical research on digital technology driven innovation. Management and organizational scholars have been focussed on interconnections between digital transformation and innovation management in recent past. However due to a fragmented research on the interplay between digital transformation and innovation management, practitioners and researchers lack a framework to undertake decisions and evaluate current situations.

Through a systematic literature review, this study aims to develop a holistic framework systematically of key dimensions (*what*); and a framework which can be used to explore the role and approach played by digital technologies in innovations at level of firm, industry and society, based on the empirical evidence from the selected papers. The paper contributes to our understanding of the theory of digital technologies and innovations in various contexts of industries across different sectors of the economy and different levels of decision making i.e. firm, industry and societal levels.

The research objectives of this study are:

1. To evaluate and synthesize the current scenario of empirical research on digital technology and innovation in literature
2. To develop a framework for understanding and evaluating the role of digital technology in innovation
3. To identify the emergent themes and future trends

Hence this study aims to validate and contribute to an integrated framework based of Digital Technologies and Innovation based on the themes of Digital transformation, digital innovation, digital entrepreneurship, digital technologies, and business model innovations (adapted from Apio et al., 2020) applicable at various levels i.e. micro (firm level), meso (industry or competition level) and macro (institutional or society level). The papers findings are synthesized into 15 themes in the proposed framework (Table 1), and conclusions are drawn.

LITERATURE REVIEW

1. **Digital transformation:** is defined as "How companies use digital technologies, for developing new digital business model that enables more value creation and appropriation for the firm (Kane, Palmer, Philips, Kiron, & Buckley, 2015). Digital transformation is multidisciplinary and entails changes at a strategic, organizational, information technology, supply chains and marketing levels. Firms need to understand how to build sustainable competitive advantage through specific resources, strategies and organization structure to implement these strategies.
2. **Digital innovation:** is the application of digital technology for innovation of existing business processes, products or services. It can range from development of a new technology strategy to new business model adoption to implementation of a new software or platform, or transformation from analogy to digital processes.
3. **Digital Entrepreneurship (DE):** is defined as selling of digital goods or services through automated networks (Guthrie, 2014). It is an entrepreneurial activity which transforms traditional service, asset, or partial business into digitalization (Le Dinh et al., 2018). According to Hull et al. (2007) and Le Dinh et al. (2018), digital entrepreneurship allures to new ways of business creation and performance. Hair et al. (2012) referred to it as for comprehensive business models for products, workplace, or distribution transformed into a digital form of venture. In addition, Giones and Brem (2017) defined DE as doing business innovatively through the internet. Cloud services, big data, or artificial intelligence different forms of digital entrepreneurship.

4. **Digital Technologies (DT):** New technologies such as social media, mobile technologies, analytics, and internet-of-things are considered as digital technologies.
5. **Business model Innovation:** A business model is how a business or organization creates and delivers value to its customers. A business model defines an organization's target market, the need being fulfilled of that market and how the business's products or services are fulfilling those needs. Business model innovation, is the process of change in how value is created or delivered to its customers, which can be through new revenue streams or distribution channels.

METHODOLGY

Rowley and Slack's (2004) five-stage process was adopted for development of research themes and future research directions.

Selection of Indexed Databases

Scopus and Web of Science (WoS) databases were explored to search for the relevant literature. Scopus was selected for data collection due to its wide collection of quality journals and advanced search filters and data analysis grids. The bibliometric analysis paper by Appio et al., 2020 was used as source for relevant articles on the topic.

Defining Keywords (Search Strategy)

Initial search was conducted with search strings "Digital" and "Transformation", "Technologies", "entrepreneurship". Additionally, search strings of "Business model" and "innovation" were used to get the intersection of papers under the categories identified for thematic analysis. "Synonyms used for Digital like "numerical" were used with Boolean operators like "OR" to access the universal set of papers. Boolean operator "AND" was used for example for intersection of Digital and transformation.

Refining the Initial Results (Inclusion and Exclusion Criteria)

Inclusion and exclusion criteria applied helped to extract the most relevant articles for the literature review. To achieve the research objective, the search results were exclusive to empirical articles published in high quality indexed journals as they represent "certified knowledge" (Ramos- Rodríguez and Ruiz-Navarro, 2004). Conference papers, book chapters, commentaries, erratum etc., were excluded from the search results. As a result, 40 papers were finally reviewed to achieve the research objectives.

Data Analysis

The content analysis of each selected paper contributed to the intellectual structure of the research topic. Two researchers categorized the data according to the pre-determined themes from literature adapted from inter-rater validity.

Data analysis is structured in three stages.

Stage 1: Data analysis focused on categorization of the selected articles according to the pre -determined themes adapted from bibliometric analysis review paper by Apio et al, (2020).

Stage 2: Thematic analysis to synthesize the research empirical findings from the categorized papers.

Stage 3: Analysis focused on future research directions of Digital transformation and innovation: A systematic literature review.

Table 1. Themes for the systematic literature review

	Digital Transformation	**Digital Innovation**	**Digital Entrepreneurship**	**Digital Technologies**	**Business Model Innovations**
Micro	Impact of enabling technologies such as artificial intelligence, industrial internet of things, big data, and smart products on firms strategy, approach, competitiveness	Role of digital technology and its business value	How entrepreneurial firms leverage and are impacted by digital transformation and technologies	Inducing adoption of business model portfolios strategies and rapid scaling	Impact of the disruptive nature of digital transformation (DT) on firm processes
Meso	How industry structure evolves under the impact of new age technologies	Improved customer involvement in the innovation process, and enabled open platforms and architectures	How different networks and partners engage with in order to access key resources	Digital technologies instrumental role in enabling industrial co-creation practices in business-to-business contexts	Impact of DT on industry structure and competitive dynamics
Macro	How institutional mechanisms of governance and control are being transformed by digitization	Types of institutional arrangements and their effects on configurations of digital innovations	Entrepreneurial opportunities offered by new technological architectures	How digital technologies are stimulating knowledge exchanges	Impact of DT on institutional structure and policy

Adapted from (Apio et al., 2020)

Table 2a. Categorization of papers under micro, meso and macro levels of analysis

Category	Reference
Macro	Terence J. V. José María Millán et al., 2019, Oguz A. Acar, 2019, Brunswicker, 2019, Eiteneyer et al., 2019, Shaikh, 2019, Verstegen et al., 2019, Sjödin, 2020, W. Peltier et al., 2020, Alshawaaf 2020, Claussen and Halbinger, 2020, Paolo Appio, 2020
Meso	Kolloch and Dellermann, 2017, Sachithra Lokuge, 2018, Hinings et al., 2018, J.M. Ferreira et al,, 2019, Frank M. Fossen, 2019, Kollmann et al., 2019, Warren Boeker, 2019, Chalmers et al., 2019, Fisch, 2019, Nambisan et al., 2019, Balsmeier, 2019, Forman, 2019, M. Mariani et al., 2020, Cennamo, 2020, Paul Mugge et al., 2020, Hanelt, et al., 2020, Feng Li, 2020
Micro	Pieter Ballon et al., 2018, Jack Fraser, 2020, Amarolinda Klein et al., 2020, Lu Wang, et al., 2020, Reibenspiess et AL., 2020

Table 2b. Categorization of selected papers according to inductively derived themes

Themes	References
Digital Transformation	Bob Hiningsa, 2018, Cennamo, 2020, Paul Mugge et al., 2020, Hanelt, et al., 2020, Feng Li, 2020
Digital Innovation	Pieter Ballon et al., 2018, Michael Kolloch, 2017, Sachithra Lokuge, 2018, J.M. Ferreira et al,, 2019, Nambisan et al., 2019, Balsmeier, 2019, Acar, 2019, Brunswicker, 2019, Eiteneyer et al., 2019, Shaikh, 2019, M. Mariani et al., 2020, Sjödin, 2020, W. Peltier et al., 2020, Alshawaaf 2020, Claussen and Halbinger, 2020, Paolo Appio, 2020, Jack Fraser, 2020, Amarolinda Klein et al., 2020, Lu Wang, et al., 2020, Bob Hiningsa, 2018
Digital Entrepreneurship	Berger et al., 2019, José María Millán et al., 2019, Frank M. Fossen, 2019, Kollmann et al., 2019, Warren Boeker, 2019, Chalmers et al., 2019, Fisch, 2019, Nambisan et al., 2019, Reibenspiess et AL., 2020
Digital Platform	N.A
Digital Technologies	Forman, 2019, Verstegen et al., 2019
Algorithms and Other enabling Techniques	N.A
Innovation Management	N.A
Business Model Innovation	Terence J. V. Saldanha, 2017
Open Innovation	N.A

Adapted from (Appio et al, 2020) and developed for this study

DISCUSSION

Most papers have been published in Journal of Business Research (13) followed by Research Policy (10) and MIS quarterly (4). Almost all publications are from 2017 onwards indicating the recent scholarly interest in digital transformation and innovation and the emerging nature of this field. Quantitative research approach is

the most preferred empirical research method adopted with 29 out of 40 papers based on descriptive research design. Most of the data has been collected from businesses and individuals involved in digital technologies and innovation as entrepreneurs, consumers, employees.

Digital Transformation (DT): Micro

Concept of digital transformation is linked with the recent new age technologies such as artificial intelligence, industrial internet of things, big data, and smart products.

Table 3. Distribution of articles by leading research journals since 2000

Journals	References
Journal of Business Research	Ferreira et al,, 2019, José María Millán et al., 2019, Fossen, 2019, Kollmann et al., 2019, Boeker, 2019, Chalmers et al., 2019, Fisch, 2019, Nambisan et al., 2019, M. Mariani et al., 2020, Sjödin, 2020, W. Peltier et al., 2020, Alshawaaf 2020
Research Policy	Nambisan et al., 2019, Balsmeier, 2019, Acar, 2019, Brunswicker, 2019, Eiteneyer et al., 2019, Forman, 2019, Shaikh, 2019, Verstegen et al., 2019, Claussen and Halbinger, 2020
Journal of Product Innovation Management	Paolo Appio, 2020
MIS Quarterly	Satish Nambisan, 2017, Fredrik Svahn, 2017, Philipp Hukal, 2017, Terence J. V. Saldanha, 2017
California Management Review	Cennamo, 2020
Research Technology Management	Paul Mugge et al., 2020
Journal of Management Studies	Hanelt, et al., 2020
Long Range Planning	Fraser, 2020
Technological Forecasting and Social Change	Kolloch and Dellmann, 2017, Klein et al., 2020, Lu Wang, et al., 2020
Information and Management	Reibenspiess et AL., 2020
Information and Organization	Bob Hiningsa, 2018
Telematics and Informatics	Pieter Ballon et al., 2018
Information and Business	Sachithra Lokuge, 2018
Technovation	Feng Li, 2020

Empirical research demonstrates how digitally mature organizations are oriented towards externally driven strategies. Digital transformation requires an agile and collaborative development process which is innovative and responsive to dynamic changes in customer needs, display of knowledgeable and entrepreneurial behaviours and culture of timely and open communications. Digital transformation requires support of R&D, operations, customer service, corporate training, sales support, IP law, etc. For DT, goals should be aligned with the digital capabilities and benefits of the organization (Mugge et al., 2020).

Digital Transformation: Meso

The transformations triggered by digital technologies are non-linear, ambiguous, and intersect with prevalent managerial challenges of short term and the long-term trade-offs, prioritizing decisions, integrating knowledge, engaging stakeholders, structuring organizations and incentives, managing interdependencies, and building culture (Cennamo, 2020). These challenges need to be managed within a new, different, and evolving context which is dynamically transformed through affordability of digital technologies of pervasive connectivity, automated decision making, and virtualization, speed of change, and unanticipated product functionalities and applications which enhance the opportunities to explore new revenue and business models. Business transformation process involves (1) Transformation Strategy (future purpose), (2) Transformation Design, (future business system, organizational characteristics, work patterns and implementation design) (3) Transformation Delivery (mindset and organizational culture), and (4) Governance and Leadership (shared vision) (Gudergan et al., 2015). However, the nature of DT is only partially covered by conventional frameworks on organizational change (Hanelt, et al., 2020).

Incumbent firms must manage the systemic intersection of issues and the on-going trade-offs between four issues of c*capability (existing versus requisite), focus (product versus process), collaboration (internal versus external), and governance (control versus flexibility* (Svahn, 2017). Companies' innovative capability is a function of their overall business competitiveness. Entrepreneurs' personal characteristics, (Lafuente et al., 2010), explain the behaviours of companies in terms of adopting digital processes (Ferreira et al., 2019). Lokuge et al. (2018) developed a formative multidimensional construct of organizational readiness for digital innovations which includes 21 measures forming seven sub constructs: resource readiness, IT readiness, cognitive readiness, partnership readiness, innovation valance, cultural readiness, and strategic readiness. Incumbent firm need to manage the four competing issues of capability (existing versus requisite), focus (product versus process), collaboration (internal versus external), and governance (control versus flexibility cohesively by continuously balancing new opportunities and established practices (Svahn, 2017).

Digital Transformation: Macro Level

Digital transformation is driven by novel institutional arrangements, infrastructure, institution building blocks which enable novel digital organizational forms to gain social approval (i.e. legitimacy) in the eyes of critical stakeholders and their interplay with existing institutional arrangements (Hinings, 2018). The direction and pace of change depends on the rate of institutionalization i.e. new norms, values, institutional logic which can be accelerated through policy.

Digital Innovation: Micro

Based on an empirical model on the determinants of the use of technological-based innovation by micro and small enterprises in Indonesia, business factors and firm and owner characteristics explain the causes of barriers of adopting digital innovation. Firms with lower direct selling costs, higher income and selling during Covid 19 and facing competitive pressures are likely to adopt digital innovation. Younger firms with younger owners with access to internet have higher probability of digital technology adoption(Maya) Controversies both shape and define the structure of the innovation as well as the selection of each individual actor of the ecosystem especially during the forming phases (Kolloch and Dellmann, 2017)

Tele medicine (TM) innovation adoption by stakeholders is impacted directly, and indirectly through comparable service quality value perception and ease of access to care which are a function of digital communications from varied actors (Peltier et al., 2020).

Agile value co-creation processes involves value proposition definition (agreeing on value distribution), value provision design (deciding on the profit formula), and value-in-use (creating and regulating incentive structures) delivery. Further, success is determined by the alignment of specific value creation and value capture activities in each phase: identifying value creation opportunities—agreeing on value distribution in value proposition definition, designing the value offering—deciding on the profit formula in the value provision design, and finally refining value creation processes—regulating incentive structures in the value-in-use delivery (Sjödin, 2020).

Globalization, R&D, GDP, financial development, and human capital are important factors in explaining technological innovation. There is bidirectional causality from economic globalization, financial development, human capital index, research and development expenditure, and real GDP to technological innovation, and vice versa. (Wang, 2020)

Based on an in-depth qualitative analysis, the study by Claussen and Halbinger, (2020) illustrates how consumer goods companies collaborate with digital BDA firms to test new products before they are launched on the market, and innovate (Mariani

et al., 2020). Mechanisms of Innovation quality, the use of recombinant innovations, and innovation documentation are pre-innovation platform activities can lead to successful diffusion of innovative consumers' first innovation on digital platforms.

Non-pecuniary extrinsic benefits, such as recognition and career advancement, can also drive appropriateness of solution which is a motivator for crowdsourcing solutions though social learning and prosaically motivation are associated with inappropriate solutions (Acar, 2019).

Innovation in open source Digital platforms by developers are dependent on an inter temporal tension of coherence with the past versus flexibility to engage with an uncertain future while making an innovative contribution to an app on their platform (Brunswicker, 2019).

Social capital embedded in ventures' crowd funding community networks promotes the involvement of backers in new product development and, ultimately, new product innovativeness (Eiteneyer et al., 2019). Firms must move beyond choosing a partner based on whether its expertise fits their problem, towards evaluating community, and perhaps ecosystem, health (Shaikh, 2019).

Digital Innovation: Meso

Digital platforms innovation is a dynamic process of interaction between human actors and non -human elements. Multiple perspectives enable incumbent firms to manage digital disruptions effectively as it allows the firms to adapt to the various challenges emerging from the changing context.

The digital platform innovation process is analysed as a process of translation, in which there are possible controversy emergence points originated in types of disagreements among the different human actors involved and their interactions with non-human elements related to specific features of digital platforms: the digital platform generatively, the multisided market arrangements in the platform; the loosely coupled layers of technologies and applications involved, and the opaqueness that results from these arrangements (Klein et al., 2020)

Combination of multiplexed frames and a holographic distribution enables the incumbent organization to rapidly switch between different responses to the unfolding disruptive innovation in a relatively short timeframe (Fraser, 2020).

Digital Innovation: Macro

Increased investment in digitalization is associated with increased employment of high-skilled workers and reduced employment of low-skilled workers, with a slightly positive net effect (Balsmeier, 2019) and may require development of complementary skills and assets. Digital innovation at industry and societal level can be enhanced

through introduction of new digital technologies, openness of the digital asset, digital affordances and digital technology generativity (Nambisan et al., 2019)

Digital Entrepreneurship: Micro

Digital entrepreneurship platform has a positive effect on employees' development of innovation ideas (Reibenspiess et al., 2020). Hence internal open innovation platforms provide support for entrepreneurship which is also evidenced in other industries. Incorporated business is more likely and starting an unincorporated business is less likely for employees facing transformative digitalization.

Apparently, advances in AI create opportunities for growth-oriented entrepreneurship, but also increase the opportunity cost of less ambitious entrepreneurship (Fossen, 2019). Digital entrepreneur's failure is reflected in their social media communications. The financial, social, and psychological consequences of failure are reflected in entrepreneurs' Tweets and lead to changes in their digital identities and entrepreneurs' language decreases in emotional tone indicating increased psychological distress. Higher levels of self-assurance and reflection after failure are also observed (Fisch, 2019).

Digital Entrepreneurship: Meso

Different combinations of EO dimensions and types of cooperation partners explain product/service innovation in digital and non-digital contexts (Kollmann et al., 2019). Parent firm and co-inventor innovativeness significantly impact venture knowledge quality, with this benefit significantly enhanced when parents possess superior information technology systems (Boeker, 2019). Chalmers et al., (2019), identified three interlinked external enablers of new venture ideas: block chain, ideology, and market volatility. The empirical findings of study by Nambisan et al. (2019) broadly support the study thesis regarding the significance of role conflict in understanding entrepreneurs' behaviour and venture performance in digital ecosystems.

Digital Entrepreneurship: Macro Level

There are indirect negative inertia effects of job tenure (i.e., entrepreneurs who have been running their business for a relatively long period of time) on earnings (via low ICT adoption and use). Increase in earnings associated with ICT adoption and usage is larger for SEWE (self-employed with employees) and (DSEW).types when compared to both IOA (independent own-account workers) and DSEW (dependent self-employed workers) types, (Millán et al., 2019)

Business Model Innovation Macro

Platform signals influence the generation of platform content by compliments in terms of the volume and diversity of information on the platform in content creation (Hukal, 2017). Customer involvement impacts business model innovation. RIPC (relational information processing capability) positively moderates the relationship between PCI (product focussed customer Involvement) and amount of firm innovation and that AIPC (analytic information processing capability) positively moderates the relationship between ICI (information intensive customer involvement) and amount of firm innovation (Saldanha, 2017)

Business Model Innovation: Meso

Based on SLR and empirical research of mini case studies, novel and radically reconfigured business models are not only based on based on radically new ideas, but enable firms to deploy a portfolio of business models adapted for new domains or new products in the online environment. It follows that a business model innovation can develop around not only new ideas, but also new application domains or new impacts (Feng Li, 2022).

Digital Technology: Micro

Organization usage of digital technologies can be explained by configurationally usage. Actors organize usage in collectives through activities configuring-in-use and reflecting by combining these two organizational activities in order to realize collective-level goals related to pervasive use of technology (Verstegen et al., 2019). Business factors as well as firm and owner characteristics explain the barriers of adopting digital technologies by small firms. Firms with higher income and sales mostly adopt digital technologies in their business activity (Damayanti et al., 2018).

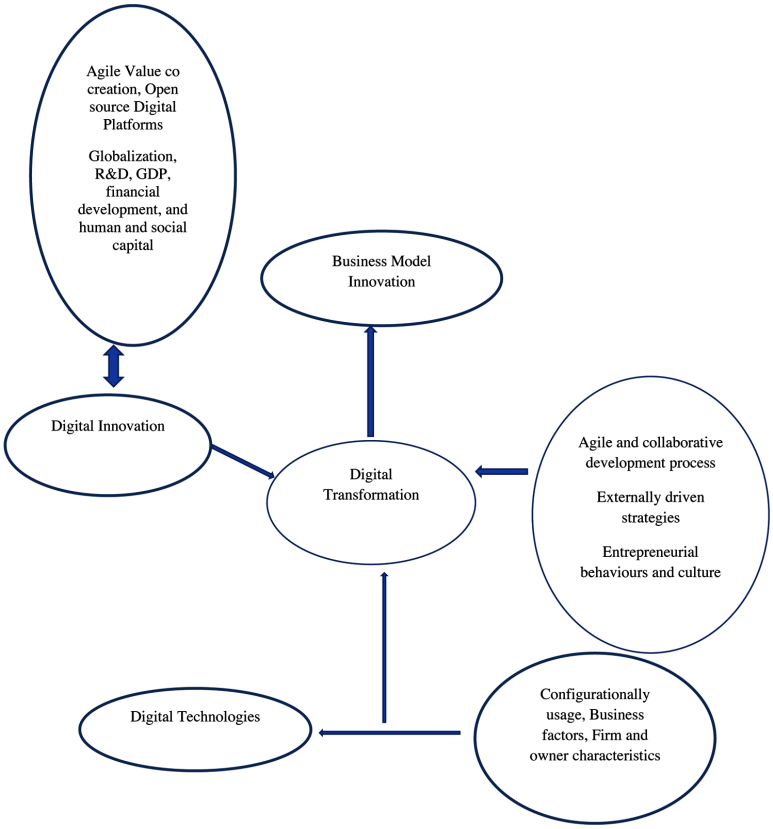
SUMMARY OF FINDINGS

The findings from empirical research papers are summarized in Table 4. A model of micro (firm level) digital technology and innovation is developed (Figure 1) which could provide direction to managers and leaders of business and start-ups for digital technology and Innovation.

Table 4. Summary

Themes	Summary of Findings
Digital transformation-Micro	Digital transformation at firm level needs to be externally driven; goals should be aligned with capabilities; development process should be agile and collaborative development and responsive to dynamic changes in environment; and entrepreneurial behaviours and culture of timely and open communications within the firm
Digital transformation-Meso(Industry or competition level)	Digital transformation at industry level requires Incumbent firms the trade-offs of *capability (existing versus requisite), focus (product versus process), collaboration (internal versus external), and governance (control versus flexibility).*
Digital Transformation-Macro or Societal level	Digital transformation at societal level requires institutionalization of novel digital organizational forms, novel digital institutional infrastructures, and novel digital institutional building blocks The pace and direction of change requires institutionalization of new norms, values, or institutional logics,
Digital innovation-Meso	Digital platforms innovation involves dynamic interaction between human actors and non -human elements. Multiple perspectives enable incumbent firms to manage digital disruptions effectively.
Digital innovation-Macro	Digital Innovation at the societal level can be accelerated by infusion of new digital technologies, openness of the digital asset (access to knowledge or platform), digital affordances(for example standardized and common technology platforms)and digital technology generativity (for example number of re-combinable digital assets)
Digital Innovation-Micro	Digital innovation at firm level is driven by agile value co-creation processes involving value proposition definition and value distribution), and alignment of specific value creation and value capture activities in each phase. Non-pecuniary extrinsic benefits, such as recognition and career advancement, social capital and Globalization, R&D, GDP, financial development, and human capital are also important factors.
Digital Entrepreneurship-Micro	Digital entrepreneurship platform, internal open innovation platforms, transformative digitization in the firm and Digital technologies like AI encourage digital entrepreneurship within the firm. Digital entrepreneur's failure is reflected in their social media communications. Higher levels of self-assurance and reflection after failure are also observed
Digital Entrepreneurship-Meso	Different combinations of EO dimensions and types of cooperation partners explain product/service innovation in digital and non-digital contexts.Three interlinked external enablers of new venture ideas are: block chain, ideology, and market volatility
Digital Entrepreneurship –Macro level	Indirect negative inertia effects of job tenure on earnings (via low ICT adoption and use) discourage digital entrepreneurship at the macro level. Increase in earnings associated with ICT adoption and usage is larger for SEWE.
Business Model innovation-Meso	Novel and radically reconfigured business models are not only based on radically new ideas, but deployment of portfolio of business models adapted for new domains or new products in the online environment.
Business Model innovation-Macro	Platform signals influence the generation of platform content by compliments in terms of the volume and diversity of information on the platform in content creation.
Digital technologies-Micro	Business factors as well as firm and owner characteristics explain the barriers of adopting digital technologies by small firms. Firms with higher income and sales mostly adopt digital technologies in their business activity.
	Actors organize usage in collectives through activities that we call configuring-in-use and reflecting; and that they combine these two organizational activities in order to realize collective-level goals. We identify the combination of these organizational activities as configurational usage

Figure 1. Micro level model of Digital transformation and innovation



CONCLUSION

Synthesis of empirical research on Digital transformation and innovation literature shows that digital transformation of firms is driven by external triggers especially the rapid emergence and evolution of new age technologies and are impacting all functions and organizational processes. The challenges are related to managerial trade-offs, both short and long term and emerging opportunities of applications and new revenue streams. Incumbent firms need to manage the challenges of ccapability (existing versus requisite), focus (product versus process), collaboration (internal versus external), and governance (control versus flexibility). Digital innovation is a result of dynamic interplay of human actors and non-human elements. Digital entrepreneurship is determined by entrepreneur characteristics as well as organizational resources and capabilities. Most opportunities emerge at the intersection of technology, ideology and market volatility.

Business model innovation requires radical and adaptive reconfiguration of ideas so that firms can deploy a portfolio of business models adapted for new domains or new products.

Future Research Directions

The quantum of empirical research on selected topic is limited. Hence there are varied and significant research opportunities.

Digital Transformation: has been researched mostly in developed economies and social and cultural contexts which affords opportunities to extend the research in to emerging economies and digitally developing social systems. Digital transformation needs to be researched from perspectives of various types of organizations i.e. market leaders vs. challengers, innovators vs. followers, product vs. service firms, consumer vs. B2B organizations, profit vs. non-profit organizations so that an integrated and universal framework emerges. There is an over emphasis in literature on external impact of digital technology on business performance and behaviour compared to the positive and pro-active adoption of technology for serving social needs, governance and institutional frameworks for digital equality and access. Hence future research on social transformation through digital innovation could provide policy makers and governments with decision making models which are empirically validated.

Implications

Theoretical Implications

The 5*3 matrix adopted for categorization of research findings in this study can be further validated as a theoretical model for research and decision making in digital transformation and innovation. The relationship between various constructs of digital innovation, digital transformation, and business model innovation are validated. The direction and nature of relationship between the themes of digital technology, digital innovation, digital transformation, business model innovation is empirically determined.

Managerial Implications

Managers and policymakers can use the model (Figure 1) of micro level "digital technology and innovation" proposed in this study to evaluate and implement digital technology driven digital innovation and transformation of the firm. The empirical findings provide validation of the variables and constructs to be considered in responding to and initiating digital transformation of business. This study identifies

the factors and processes to be adopted by firms for executing digital technology driven innovation, transformation and business model innovation through empirical research. The model can be further adapted by firms based on their experience and learning's.

This study identifies the process of Digital innovation, digital transformation and business model innovation at industry and societal level grounded in empirical research. The findings of this study can be used for exploring, leveraging and predicting the evolution and trajectory of digital technologies activated innovation and transformation at the industry and society level. Business can adapt them to the context and position themselves for competitive advantage and growth by employing the findings from this study. Managers can take appropriate decisions to ride and survive the disruptive and incremental technological innovations shaping industry and society.

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Chapter 12
HR 4.0 Exercise in the Post-COVID-19 Scenario:
A Study Towards Impact on Private Sector Employees

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ABSTRACT

The coronavirus pandemic has adversely affected the private sector in building the economy. And private organizations and the people working in them have been harshly affected both in the time and post COVID-19 with delicately facing conflicts in personal and professional life. The pandemic of COVID-19 has rapidly developed into a worldwide monetary emergency with the health of employees and is spreading to the real sector in addition to posing a developing threat to the monetary structure. In delicate and conflict-affected circumstances the difficulties related to the pandemic have to be faced on top of the significant difficulties currently working in the private sector. COVID-19 has affected the health of employees mentally and physically, socially, publicly, personally, and professionally.

INTRODUCTION

The Coronavirus pandemic has set off nearly all outstandingly awful positions emergencies since the cost-effective crisis of the early 21st century. There is a genuine peril that the emergency will build neediness and broaden disparity, with the effect felt for quite a long time in the future. Nations currently need to do all that they can to

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prevent this positions disaster from transforming into a social emergency. Remaking a superior and stronger work promote is an essential interest later on and in people in the future. The COVID-19 pandemic has affected the private organizations financially due to which the private organizations have been closed and the employees have become jobless resulting in unemployment. There is a real danger that this crisis has exacerbated poverty and increased inequalities. The impact of which will be felt in the years to come. The consequences of the coronavirus pandemic on monetary action, business and the way we operate have been widespread. The Coronavirus pandemic has set off one of the most horrendously terrible positions emergencies since the economic crisis. There is a genuine risk that the emergency will increment neediness and augment disparities, with the effect felt for quite a long time into the future. Nations presently need to give their best to prevent this position's emergency from transforming into a social emergency. Recreating a superior and stronger work market is a fundamental interest from here on out and in people in the future. The work ramifications of the Coronavirus pandemic straightforwardly affect representatives' presentation, particularly when thinking about the workspace climate. Thus, these setbacks could potentially moderately affect emotional prosperity. In this section we aim to determine the various methods in which the pandemic has affected the worldwide work market and universe of work and to examine the downstream effects on the prosperity of specialists worldwide. We expand on this test by exploring the important drivers of worker versatility during an emergency. In the last area, researcher anticipates how progress in the worldwide work market at decline stage due to the coronavirus may affect the market. In doing so, we present a speculative record of how the consequences of the pandemic may begin to change workers' perceptions and how long these advances may affect private workers in the work environment for futures days.

REVIEW OF LITERATURE

Narayanamurthy and Tortorella (2021) the coronavirus had a huge and significant impact across the world. The business world has been stormy, and the monetary landscape of the nations has shown dire execution. There has been a drastic reduction in representatives and salary allowances in many unions as the business environment has been adversely affected by the outbreak of the pandemic. The review is expected to examine the impact of the coronavirus on brain research from representatives working in secretive associations. A subjective examination was directed with 22 centre-level Indian representatives used in confidential sector associations. The results demonstrated that the members experienced a sense of mental pressure, social isolation and depression during the lockdown period. Austin-Egole et al. (2021)

surveys the ongoing status and future outlook of biomedical science with respect to the coronavirus, including anticipation, demonstration, screening and treatment through nanotechnology, vaccination designing. A potential area for biomedical science to fight SARS-CoV-2 infection Because of the interesting difficulties posed by the pandemic, as revealed by disease transmission experts, immunologists and clinical experts, including coronavirus endurance, side effects, protein surfaces. The survey points to the ongoing impact of biomedical science in medical services for the administration of the coronavirus, as well as some difficulties in talking about it. Bai et al. (2021) states their review highlights the direst financial impacts of the coronavirus pandemic in Nigeria and the most fundamental needs during the lockdown. We recognized that the palliative approach did not help the administration meet its planned objectives as the strategy challenges were taken care of; inadvertently relaxed checks were used to regulate a survey on occupants via on-the-web/electronic review, of which 1232 web clients participated. The information collected was dissected using both illustrative and inferential measurements. Kooli and Lock Son's (2021) examination is focused on the same coronavirus disease Mankind The increase in the pace of change in Industry 4.0, which is one of the components under it Change and growth as before the impact of digitalization in every sector is a fundamental component According to the findings of the investigation, it The coronavirus cycle is believed to have a huge impact in the progress of digitization and that a critical phase in the transformation of Industry 4.0 is believed to have been abandoned after the coronavirus. Oshi (2021) the list of sources for this exploration contains logical information and it is felt that this study can be a reference hotspot for in-store exams since the pandemic cycle is kept updated with news and there are very few exams in writing right now.

Moreno (2020) the paper aims to cover discoveries resulting from a worldwide review, which zeroes in on the coronavirus pandemic impact on movement attitudes and conduct expectations and proposes discoveries that the attribution hypothesis could represent global travel and travel within its own nations. People reporting the spread of coronavirus in the U.S. are obliged to travel abroad. In fact, large-scale contrasts are observed between different generational partners with regard to apparent travel dangers, domestic and worldwide travel. Creativity the impact of a welfare emergency on domestic and worldwide ventures envisioned in a solitary model is missing from the writing. The creators have proposed a model to represent the impact of the pandemic on viewers' attitudes and goals to travel and whether the impact of the mistake influences objective decisions of travel. Farooq et al. (2021) states most of the financial slowdown due to the COVID-19 pandemic has resulted from deficiencies in the monetary framework. This investigative paper examines the impact of the coronavirus pandemic on the worldwide consolidation and receiving movement by providing measurable

information about social phenomena around the world's exchange volume, value and type, the review target is achieving the beat. How consolidation, acquisitions and other reconstruction exercises have been used to aid corporate goals amid these unprecedented times. While the undeniable impact of the coronavirus is yet to be fully captured (in mid-2021), the review attempts to underline how this shift in monetary dependence has led to the innovative destruction of Schumpeterian businesses. As firms plan for the growth that will follow this downturn, M&A will empower organizations to examine the future implanted with innovation and radically unique action plans. This investigative paper consequently captures the conscious change taking place in the world of systems to examine the conceivable view of the M&A bargaining market in the post-pandemic world.

EFFECT OF COVID-19 ON PRIVATE EMPLOYEES

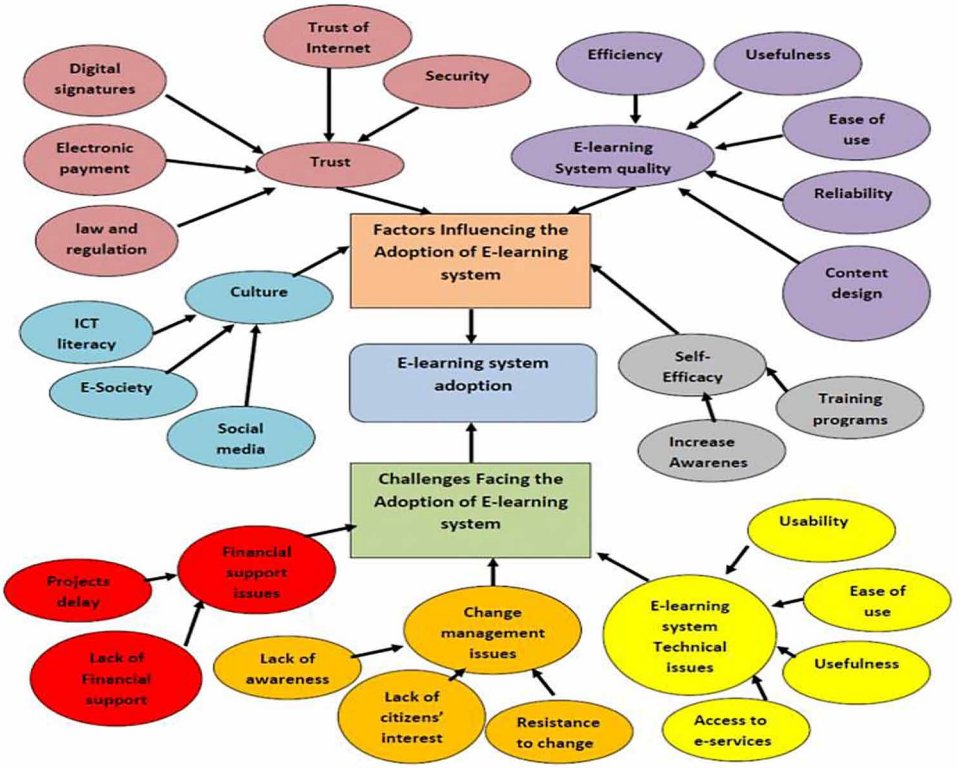
Undoubtedly the COVID 19 pandemic in India has affected India's employment figures very badly since the beginning of 2020, rather negatively. We have seen many scenarios like large number of corona infections, corona testing, containment zones, safe houses and quarantine since March 2020, masks, sanitizers, PPE kits, rush of ambulances, healthcare workers, i.e. doctors, nurses, paramedical staff, other support staff, police personnel and most shockingly there have been helpless deaths. Simultaneously, researcher have also seen another type of scenario like lockdown in industrial units, a queue of unemployed laborers walking towards their native villages with hungry children, women, elderly family members etc. But lakhs of helpless migrant laborers including private employees, their families, took to the road to their native places or unknown places. The most interesting scene which gave me inexplicable pain is that these laborers lost their nationality while crossing hundreds of kilometers on foot along national highways. The factories, in which they have sweated for years, drove them away without making any arrangement for their accommodation and food. Mostly Indian citizens did not get any help from the government on the way. Some of them were denied entry when they were about to enter their own village; they looked empty across the bamboo fence! The police caught them in the middle and kept them wherever they wanted. As if these migrant laborers were expelled from the war! These pictures were not only of unemployment but have raised many such questions which our welfare state could not answer. Now, all are facing the second wave of the COVID 19 pandemic roughly from March 2021. I don't know why the corona infection flared up in India after the financial year. This time the pandemic situation is somewhat different from 2020. We hired hundreds of flights to transport tons of vaccines to different countries of the world. But the humorous god was smiling

out of nowhere. Due to lack of money, we have seen the private employees who were jobless; die due to lack of oxygen cylinders, oxygen concentrators, ventilators, medicines in the horrific crisis of mankind. The second wave has again thrown the entire health machinery into disarray. The COVID pandemic brought India's economy to a halt during the last year, and various individuals lost their positions, especially women. The pandemic has fueled unemployment that has caused women to lose pay, as well as neglected attention and the hassle of domestic work. While everyone is facing extraordinary difficulties, women are going from side to side the worst of economic and social consequences of coronavirus. Women who are poor and underserved face a much higher risk of coronavirus transmission and death, job loss and extended viciousness. Worldwide, mostly ratio of health workers and specialists on call are women, but employees are not standard with their male partners. Sex harassment and sexual orientation in private jobs is more than ever. Here's how the coronavirus is hitting back at women's financial growth in excess of the past several years, except if we act now, and act consciously. The Coronavirus emergency has drastically altered the manner in which individuals live and work. While most examinations have zeroed in on winning unfortunate results, possible positive changes in regular daily existence stand out enough to be noticed. In this way, we inspected the real and saw generally speaking effect of the Coronavirus emergency on work and private life, and the outcomes on mental health and self-awareness. Compulsory brief time framework was firmly connected with an apparent adverse consequence on work-life, while telecommuting, especially whenever experienced interestingly, was unequivocally connected with an apparent positive effect on work life. Concerning private life, more youthful age, living alone, decrease in relaxation time, and changes in the number of caring obligations were emphatically connected with seen adverse consequences. Conversely, living with an accomplice or family, brief time framework, and expansions in recreation time and caring obligations were related with an apparent positive effect on private life. The apparent adverse consequence of the emergency on work and private life and obligatory brief time framework was related to lower mental health and self-awareness. Additionally, saw the positive effects on private life and an expansion in recreation time was related to higher mental health and self-awareness. Social stigma with regards to wellbeing is the pessimistic relationship between an individual or gathering who share specific qualities and a particular illness. In an episode, this might mean individuals are marked, generalized, victimized, treated independently, as well as experience loss of status in view of an apparent connection with a sickness. The ongoing Coronavirus episode has incited social disgrace and oppressive ways of behaving against individuals of specific ethnic foundations as well as anybody saw to have been in touch with the infection.

PERSPECTIVES OF EMPLOYEES TOWARDS COVID-19 IN INDIA

An ongoing pandemic due to COVID 2, the COVID disease (coronavirus) has represented a worldwide health threat in many countries and domains. Coronavirus has affected every section of life like economy, medical services, schooling, sports, travel industry, work, diversion, transportation etc. Coronavirus has brought a huge decline in our economy. Significant decline in GDP (Gross Domestic Product) growth and securities exchange. Ease of collection of basic goods, fall in supply of basic goods, misfortune in public and global trade and further low financial status persons are deeply affected during the current pandemic due to monetary crunch. COVID-19 has caused disruptions in wellbeing and health administration in India in various ways. One of the initial difficulties faced by medical services workers is the determination, contact, quarantine, and treatment of confirmed or linked cases of coronavirus. Despite fitting supplies, beds, protective veils, sanitizers and even ventilators for patients with extreme cases, most emergency clinics faced a severe shortage of ECMO machines. The interest for personal protection hardware has increased a hundredfold, leading to cost escalation a few times above standard cost and suspension of supply of diagnostic items and analytical packs. There was a shortage of personal defensive hardware around the world. Patients with diagnostic supply interruptions and other illness and medical related problems are being dismissed. There was an enormous burden on the functioning of existing medical clinics, overburdening specialists and other medical care specialists, who were at extremely high risk. Despite the real dangers, the pandemic has placed an exceptional quantity of mental load on medical care workers, who, presented in appeal settings for extended periods, live in constant fear of openness to infection while isolated from family and social distancing face humiliation. The stress of bringing the virus home and passing it on to your relatives, i.e., elderly parents, infants and immune compromised family members. Medical service specialists are subject to extended feelings of anxiety when caring for uncooperative patients, not sticking to wellbeing instructions, and feeling defenseless when managing terminally ill patients, because of limited access to advanced care beds and resources. As no conclusive therapy is available. The pandemic has caused friendly unrest and mental injury in the general society. Even though the fact that the current emergency may be accompanied by opportunities for self-improvement and family attachment, the disadvantages may outweigh these gains. The interruption in the celebration of social, strict and joyous occasions forced a total change in the psychosocial environment in the affected countries. The disconnection, limitation of contact, social isolation with our peers and relatives have created extreme panic, tension among the people. That fear of getting an infection prompted a drastic change in our regular routines. Closing of

Figure 1. Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic



schools, educative foundations and online methods of training completely affected the emotional well-being of youth and adolescents. Anxiety, lack of mate contact, and malaise were observed in offspring of all ages. Helpline should be provided along with additional guiding focus. Individuals with psychological health problems should be given family guidance and additional support. The network needs to be taught about psychological well-being, shame and how to handle issues of emotional well-being. In any case, advances in research will aid in creating the appropriate adjunct specialists and vaccinations against the coronavirus in a short time frame. Till that point, we should only depend on various preventive measures, for example, hand hygiene, social distancing, wearing covers etc. to control this pandemic.

Innovative difficulties such as the shortage of safety concerns for employees in private jobs are among the main explanations, while three exams have recognized a lack of understanding as being responsible for the frustration of e-learning. Three investigations have mentioned that college preparation is one of the major motives following the disappointments of e-learning reception. In any case, the issue of under-

use reception actually exists because of some elements that make students hesitant to use the new innovation in Jordan. Therefore, accurate searches are important to identify the most important difficulties that the e-learning framework used at some stage in the coronavirus pandemic to help leaders in colleges to defeat the issue of under-utilization of the e-learning framework.

The exploration philosophy system in this review includes three fundamental steps as introduced in Fig. In phase one, an audit of writing on e-learning reception factors and difficulties is led. In phase two, a topical examination was used to identify and order e-learning reception factors and difficulties. Specifically: familiarizing with information, creating initial code, looking for topics, marking and naming topics, and delivering a final report. In the third step, the basic difficulties and elements of e-learning reception are gathered and fixed. In accompanying areas, we will delve into the information classification strategy, review test, and information examination method used in this review. Subjective strategy is the most ideal way to thoroughly examine members' encounters, mindsets, and convictions, as it does not view realities objectively, yet as an abstract reality identified with contradictions in each individual. Moreover, it is a useful technique to easily complete the exam spots. One of the benefits of the subjective technique in this review is to scrutinize members' data to create that relevant analysis as opposed to simply posting numeric information.

Coronavirus is significantly influencing lives all throughout the planet. Segregation, contact limitations and financial closure force a total change to the psychosocial climate of impacted nations. The current circumstance influences kids, youths, and their families astoundingly. Alongside stresses and nerves identified with Coronavirus, the monetary circumstance has deteriorated with rate of joblessness in completely impacted nations. This has come down on youngsters, youths and their families which could bring about trouble, psychological well-being issues and violence.

IMPACT OF COVID -19 ON MENTAL HEALTH OF EMPLOYEES

As the Covid-19 pandemic quickly clears across the world, it is prompting a significant level of dread, stress and worries in the populace in general and among specific gatherings specifically, like more seasoned grown-ups, care suppliers and individuals with a hidden medical issue. In open emotional wellness terms has the real mental effect on a time raised paces of pressure or uneasiness? However, as new measures and effects are introduced exclusively in quarantine and its effects may be associated with apathy, sadness, destructive alcohol and drug use, and self-injury or self-injury at the level of many individuals' specific practice, schedule or job, effects on destructive behavior are also expected. In populaces currently vigorously

impacted, like Lombardy in Italy, issues of administration access and congruity for individuals with creating or existing psychological well-being conditions are likewise now the main issue, alongside the emotional wellness and prosperity of forefront laborers. As a component of its general well-being reaction, WHO has worked with accomplices to foster a bunch of new materials on the psychological well-being and psychosocial support parts of Coronavirus?

ROLE OF HR DURING AND AFTER POST-COVID-19 SITUATION

The human resources division is at the core of all worker-driven needs of any union. HR experts are human agreeable, who know how to treaty with the organization's work process by guaranteeing that everyone is operating flawlessly and that the organization's strategies are refreshed regularly. Traditionally, this work affects face-to-face contact with each employee for the duration of the day. HR competence has been instrumental in procuring, up skilling, and improving representatives and compromising within collaborating groups.

Over time, the scope of HR has evolved from being limited to worker fulfillment, to largely affecting the general development of the organization. The impact of innovation has brought some changes and has made human resource an essential empowering influence for any work environment. The fortunate organization of digitization and human resources produced some favorable results such as powerful asset management, pre-requisite assessment, capacity acquisition and enrollment evaluation. Coordinating a wealth of on-board programming within HR groups has brought about clever HR programs and compelling authority of post-coronavirus status. The coronavirus pandemic has affected all unions and enterprises alike, yet the results are different. While some organizations thought it was not difficult to carefully change and revive their functions without error, others are still turning some extreme memories to a computerized method of working. This one-sidedness has been a component of some of the elements in which organizations are using advanced efficiencies and governance strategies to carefully engage individuals.

The frivolous idea of far from workplace working has now become basic and HR has novel obligations to address. They need to establish a shared conviction for each representative from different topographical and financial foundations, especially for workers living in interior areas. At this point the need for robotization and adaptable collaboration tools has grown tremendously. As a serious task to strengthen the representatives living in level two urban areas, many reputed organizations have made major efforts in few months to work with the basic foundation, which has resulted in remote-turning for them. Distant help also extends to the portion of good. Circumstances have made well-being and safety for all workers a touchy

issue and human resources need to guarantee that everyone can benefit from all possible benefits. HR can share real prosperity measures and critical arrangements or welfare support bundles to ease workers' concerns. The pandemic has played its card to show that we can be property provided we are philanthropic enough. As the outcome of the pandemic unfold, HR experts invited new battles to battle. When organizations experience hardship, it is individuals who make victory conceivable. However, because of this overall threat, individuals themselves are at their most vulnerable. Correspondence considers an important part of any remote work group. Human resources have the ability to overcome the most extreme potential from viable correspondence.

To gain capacity and across the board, HR needed to settle on some deeper options. Executives call for a reduction in group size and significant potential gains while evaporating the income and troubled group. Then, with rising cut figures and expanded specialist admissions, activists have more questions than at any time in recent memory. The HR job scope has wide to the maintenance or removal of representatives and employees at the workplace. If for any HR group, the biggest concern is in establishing work synergies and taking care of day to day operations with the most ideal return from the representatives. Reduction in representative utility is a real roadblock for remote work groups and a viable joint effort is the main way forward. HR is responsible for revitalizing the workplace and helping delegates do their best.

RESPONSIBILITIES HANDLED BY HR DURING COVID-19

The monetary and social shock introduced by the Coronavirus pandemic is probably going to reshape the view of people and associations about work and occupations and result in both miniature and full-scale shifts in the realm of work. In this article, we center around three occupationally-related areas that might be affected by the pandemic. To begin with, an impression of the worth and status of various occupations might change, bringing about the two changes in word related market interest (large scale endlessly changes in the apparent calling and significance of various occupations. Second, the extraordinary 'work from the home experiment' may adjust word related viewpoints on telecommuting. Associations and analysts might have the option to more readily comprehend which word related and individual attributes are related to telecommuting viability and better assign word related gatherings and people to work from home. Third, we examine the expanded division of the work market which allows laborer's to stable employments and unpleasant positions and the commitment of word related division to imbalance. The Coronavirus pandemic - should in no way, shape or form be left exclusively in the

Table 1. Responsibilities handled by HR during Covid-19

• Delegating responsibility to employees on time
• Give to duties employees
• Action policy should be changed during Covid-19
• Checking Workflow of Work Employees
• Provide virtual education Responsibilities
• Boost employee morale
• Focusing on workers' health insurance

possession of overburdened faculty directors. The commitment of the line director or direct prevalent is turning out to be progressively significant. Furthermore, it is just through close and plainly characterized participation between the two that the chance for successful HR executives lies. This book expects to show this course of division of work in the singular periods of faculty the executives.

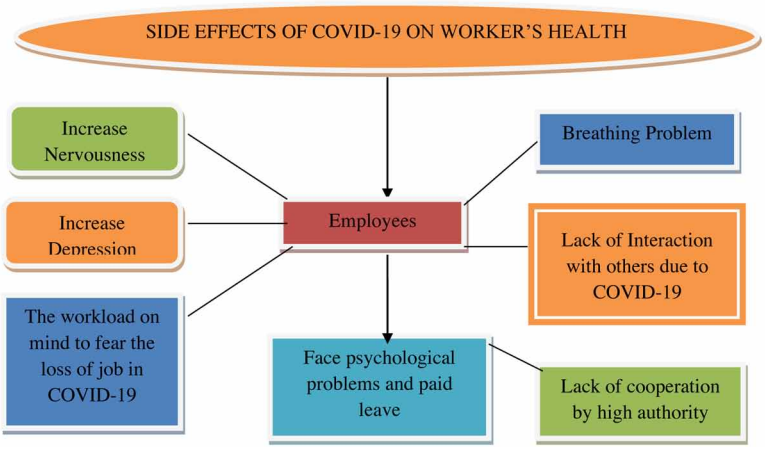
SIDE EFFECTS OF COVID-19 ON WORKERS HEALTH

The current Coronavirus flare-up has incited social disgrace and unfair practices against individuals of specific ethnic foundations just as anybody saw to have been in touch with the infection. The essential obligation of a representative is to actually accomplish the work specified by the business contract and by the directions of the business. A worker can't decline to come to work and can't deny a particular sort of work. Nonetheless, the worker has the ideal for wellbeing and insurance of wellbeing at work and the option to decline to accomplish the work on the off chance that he/she sensibly accepts that it inescapably and altogether presents a risk to his/her life or wellbeing. The danger identifying with the disease will, nonetheless, scarcely arrive at such force, and regardless of whether it is so critical as to undermine the wellbeing of the representatives, quarantine would unquestionably be requested. A worker who concurred with being sent on excursions for work in his/her work contract can't decline an excursion for work. Notwithstanding, in case it was a work excursion to an area with a proclaimed quarantine, the overall assent in the work agreement would likely not be adequate, and the worker would be qualified to deny the excursion for work.

PERSPECTIVES OF COUNTRIES TOWARDS COVID-19

A COVID-19 disaster impact is scary not only in India but also in many countries. In many countries, there were not many ways to understand these disasters and to keep themselves safe.

Figure 2. Side effects of COVID 19
Source: Compiled by Author



The coronavirus has been this devastation, and the second wave before this year was dire. This surprised many people; pace at an unimaginable pace, prompting a relaxation breakdown of an all-round general welfare framework; and we're still left with quiet crises to be fought for later. As the Emergency began, the general society associations first and foremost became an integral factor. However, at the same time, another astonishing effort cleared the nation the standard of resident volunteers. Individuals who had never taken an interest in friendly aid or aid projects ended up making decisions about oxygen or partitions, driving ambulances, debilitating individuals, or raising assets. These volunteer alliances, despite the dismay of public administration, added boundaries and highlighted the strength of common society. During the coronavirus, volunteer alliances, despite the dismay of the public administration, added limits and highlighted the strength of common society. Despite

the dismay of the public administration, volunteer alliances added limits and highlighted the power of the general population communicate the need to take a gendered look at building versatility at the same time, so that society can be more prepared, as well as establishing concrete emergency towards conventions, with the goal that disaster response and Help should be quick and adequate. Inquiries about the way each country works as well as the ability to empower impact can help.

Reliance

Our partner associations shared that trust played a vital role in bringing people together to move forward faster. The reference framework guarantees that the data is assumed to have come from fields, which work across assets and asset streams.

Nonprofits with a generally solid presence in specific topographies had the option of building a better relationship with a nearby government. In addition, admissions for government officials inevitably further develop the response time to the demands of the crisis. Residents Coalition volunteers like the coronavirus provincial responses are another example of volunteers taking advantage of past connections to 'get things done, including raising assets for self-coordinated, contingency organizations that didn't fall under any institutional umbrella. If trust is an element to a strong society, how can we put resources into greater trust while working among different partners? We understood that the key here was prior connections or tapping spaces where trust previously existed. In particular, the Allies attested to the value of their earlier noble associations with benevolent privately elected officials or local area pioneers, as these people had the option of overcoming administrative hurdles as well. This brings to the fore the issue: If trust is an element to a strong society, how can we put more trust in the resources working between different partners?

Volunteerism

In any defeat, volunteers help confine the ground. Be that as it may, we received important input from the field-put association with regard to how and when volunteers are useful versus when they disrupt everything. The subsequent wave saw many voluntary organizations move forward. Nevertheless, regular unique volunteer gatherings worked in isolation, prompting a replication of efforts that had been dominated by specialist organizations. There was a crisscross between the ability to volunteer and what area-based federations needed in many events. Institutional governance was also an issue within NGO. If a volunteer walks out, what are they leaving behind?

CONCLUSION

In view of pandemics arising out of emergent events like COVID-19, this topic is very important and contemporary for organizations. Though the long-term implications of COVID-19 are currently unknown, there is little reason to believe its impact on organizational life will be short-lived. Because to maintain the job performance of employees in the COVID-19 pandemic, giving importance to job motivation, and job satisfaction This is important because all these facts have a positive indirect effect on the employees and also on the organizational performance. The organization should focus on maintaining employee satisfaction and well-being and preparing the employees for new working conditions and taking care of their health and safety and maintaining the morale, training, employment of employees during the pandemic,

Emphasis should be placed on mental and physical development so that they also feel the security of keeping their jobs in spite of difficult situations. This sense of security enhances the confidence of the employer, which effectively maintains a satisfactory level of job performance, directly affecting organizational performance.

Future Implications

The COVID-19 virus is spreading all over the world, although it is not easy to predict when it will return to the pre-crisis period. In view of this, in view of the economic and social damage, all countries should make concrete plans after COVID-19. The current scenario planning is a tool that should be used to create designs to help organizations plan for an uncertain future. The need to think and plan in new ways in this context of the uncertainty of areas most likely to be affected by COVID-19 can help broaden our thinking about possible responses and consequences. A proactive strategy should be developed to deal with this epidemic.

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Chapter 13
Impact of the COVID-19 Pandemic on the Financial Inclusivity of Women in India

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ABSTRACT

Financial inclusivity of women during the pandemic has been discussed and analyzed. During COVID-19 the usage of cashless transactions has increased enormously. This chapter will discuss the challenges that women have faced while doing transactions in a cashless manner. For this, a constructive model for the same has been developed by the researchers in order to explain the impact of COVID-19 on the financial inclusivity of women specifically for cashless transactions. For this, the following objectives have been examined and a probable discussion on the same has been concluded: 1) to check the effectiveness of government plans and awareness schemes of financial inclusion for women, 2) coping with the challenges of technology handling and financial literacy among women, and finally, 3) to realize the overall effect of financial inclusion on financial well-being and empowerment of women. This chapter will also present its argument on the implication and discussion of steps on financial inclusivity.

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INTRODUCTION

(Sangem, 2020) reviewed in their article that in a country where the feminine internet user population is simply half that of the lads, with the divide being more distinct in rural India, this overhaul of services to digital platforms can widen inequalities. The major thing that happened is that, slowly, people started using technology, even rural people started using the technologies. So, whether it is during demonetization time, and subsequently this pandemic, maybe the disruption has been brought by these two events, that people were forced to look into the alternatives of dealing with this kind of a financial transaction. So now, whether it's a postcard vendor, or maybe a small fellow who's selling something, he will immediately bring out his QR code or something, and say that, why can't you just scan it and send me the money. But women and small businesses are the ones who got the highest and the biggest benefit of this entire financial inclusion drive, which has gone into a kind of a mobile-driven financial inclusion. Regardless of higher female work force support, most from the extending working class, Indian women are as yet found insufficient in financial information. Just 1% of Indian women can be recognized as exceptionally financially literate.

(Mouna and Jabouri, 2022) in the paper titled "Understanding the link between government cashless policy, digital financial services and socio-demographic characteristics in the MENA countries" states that poor people are excluded from the financial inclusive system, so better collaboration between the government and the financial sector can help to develop digital financial inclusion through the technology adoption channels.

Financial inclusion promotes equality through a broadening of the system and government cashless policy can be a major catalyst for greater financial inclusion. It helps in the overall economic development of the country, especially the women population.

The pandemic is certainly detrimental to remittance flow to developing countries, which is considered a driving force in the promotion of financial inclusion. It is ascertained that remittances are associated with financial inclusion, especially for women, and there was a substantial decline in remittances as a result of the COVID-19 pandemic had adverse effects on financial inclusion in the Philippines. (Eiji Yamada, 2021)

In the similar study conducted by (Afolabi, 2020), the impact of financial inclusion on overall growth of Nigeria has been studied. They discovered that financial inclusion, in the form of rural loans, bank branches, and liquidity, has a favorable and significant effect on inclusive growth in the short and long run, whereas interest rates stifle inclusive growth. More and better financial services should be made available to rural people and the economy in general which aid in reducing inequality and putting the country on a road toward inclusive growth. We have seen

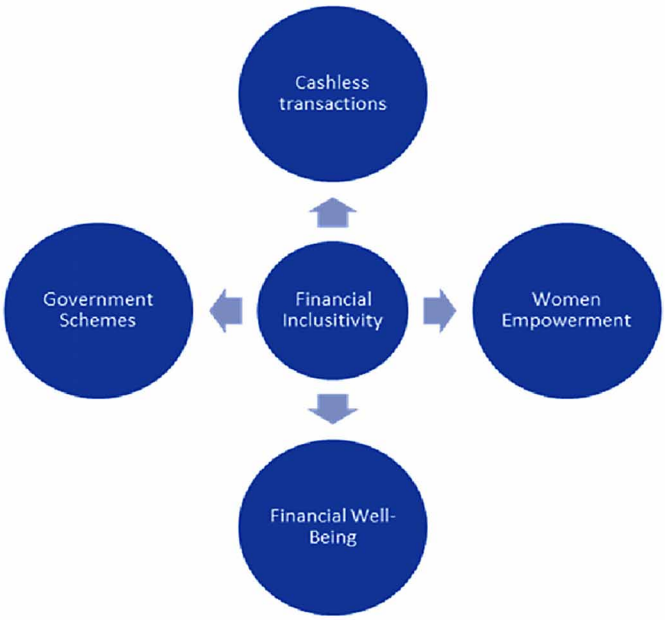
that financial inclusivity is not there in terms of financial services which were made available to the rural people of other countries as well. But here the question arises: Are people aware of such financial services?

Mostly women were dependent on the cash handling and they were in the habit of doing savings and kept that money at their houses or some unstructured money lender of society. After the pandemic, the challenges increased for them eventually one they were conditioned into an environment of financial inclusion their money was safe. Here also the question of financial literacy will arise. So for the same purpose, following research questions have been made for which the chapter will try to find out the answers after reviewing the literature.

RQ 1: The effectiveness of government plans and schemes of financial inclusion for women
RQ 2: Coping with the challenges of technology handling and financial literacy among women
RQ 3: To realize the overall effect of financial inclusion on financial well-being of women

To analyze this, a model has been proposed to better understand the notion that how covid 19 impacted the financial inclusivity of women in India.

Figure 1. Framework for Financial Inclusivity



Financial Inclusion Schemes in India

The Government of India launched several exclusive schemes for the purpose of financial inclusion. These schemes intended to provide social security to the less fortunate sections of the society. After a lot of planning and research by several financial experts and policymakers, the government-initiated schemes keeping financial inclusion for weaker sections especially women and lower income groups in mind. These schemes have been launched over different years. However, the Government of India launched several schemes between 2014 to 2019 to improve financial inclusion of women. Majorly, following financial schemes were launched to boost financial inclusivity amongst women.

- Pradhan Mantri Jan Dhan Yojana (PMJDY) (Department of Financial Services | Ministry of Finance | Government of India, n.d.)
- Atal Pension Yojana (APY)
- Stand Up India Scheme
- Sukanya Samriddhi Yojana
- Credit Enhancement Guarantee Scheme (CEGS) for Scheduled Castes (SCs)

Objectives of the Financial Schemes of Government of India

Involving common people especially women in financial schemes has been a priority of the Government. The objective of Financial Inclusion is to make financial services approachable to the large hitherto un-served population of the country to unlock its growth potential. The Government of India named these above cited schemes under The National Mission for Financial Inclusion. The India government and the Reserve Bank of India have been working together to promote financial inclusion as one of the country's major national goals. Nationalization of banks, establishment of a robust branch network of scheduled commercial banks, co-operatives, and regional rural banks, introduction of mandated priority sector lending targets, lead bank scheme, formation of self-help groups, allowing BCs/BFs to be appointed by banks to provide door-to-door delivery of banking services, zero balance BSBD accounts, and so on are some of the major efforts made in the last five decades. The primary goal of all of these projects is to reach out to significant segments of the Indian people who have previously been financially disadvantaged, the majorly lower middle class of India.

The National Mission for Financial Inclusion, Pradhan Mantri Jan-Dhan Yojana (PMJDY), was launched in 2014 and introduced with the tagline on "Sab ka Sath, Sab ka Vikas," or inclusive growth to ensure financial inclusion. It aimed to provide access to financial services, such as banking/financial planning/financial planning/ financial planning/remittance, credit, savings and deposit accounts, insurance,

pension in a cost-effective manner. Fifty-five percent Jan-Dhan account holders are women and 67% Jan Dhan accounts are in rural and semi-urban areas; these numbers certainly indicate the government's plan of financial inclusion for women since 2014.

The Atal Pension Yojana (APY) was established on May 9, 2015, with the goal of creating a universal social security system for all Indians, particularly the impoverished, underprivileged, and unorganized sector employees. The Pension Fund Regulatory and Development Authority is in charge of administering the APY (PFRDA). APY is offered to all bank account users between the ages of 18 and 40, and contributions vary depending on the amount of pension chose At the age of 60, account holder would get a guaranteed minimum monthly pension of Rs 1000, Rs 2000, Rs 3000, Rs 4000, or Rs 5000 monthly pension would be available to him, and after him, to his spouse, and after their deaths, the pension corpus, as accrued at the age of 60. This scheme also aimed to strengthen primarily the financial position of working women of the unorganized sector where there is no facility of pension and who are dependent on their husband or son after retirement.

The terms of the day in the production, manufacturing, and service sectors include "Skill India Programme," "Start-up India," and "Stand Up India." As the current administration has sworn to enhance every young person's talent, assist them in starting their own businesses, and help them become business owners rather than employees, it is their responsibility to increase GDP and employment. Additionally, it has been noted that women's categories have factually been underrepresented in this field of start-up and entrepreneurship, despite there has been a constant demand to provide them with equal opportunity to develop, showcase their talents, and demonstrate their capacity as successful entrepreneurs. a human being and Indian national. The goal of the Stand-Up India program is to make it easier for at least one SC/ST or female entrepreneur per bank branch of all scheduled commercial banks to obtain a bank loan between Rs. 10 lakh and Rs. 1 crore for starting a new business. The Stand-Up India program me offers three types of support: 1. Handholding Support 2. Offering 3. Financial Information 4. Credit Guarantee to women and young entrepreneurs exclusively.

(Sonali Bhattacharya, 2020) Sukanya Sam Riddhi Yojana (SSY) scheme launched by the Government of India (GOI) for the girl child, to take care of their education and marriage. It also had purpose to help women in wealth creation for future of their girl child, risk-free guaranteed return, and tax benefits.

To support banks and other financial institutions which are designated as Members Lending Institutions (MLIs) for the Scheme in the form of Credit Enhancement Guarantees (minimum Rs. 0.15 crore and maximum Rs. 5.00 crore) against Working Capital Loans, Term Loans, or Composite Terms Loans granted by MLIs to reserved category entrepreneurs especially women category in order to encourage and promote entrepreneurship among reserved caste women who are focused on innovations and growth technologies.

Even the government made efforts to enter into the most remote locations, which was far from online access. Real-time field transactions, beneficiary enrollment, and authentication using Aadhaar are all possible to activate and it helped largely women to access the benefits of financial schemes run by the government of India. Service delivery uses last-mile channels such as micro-ATMs, kiosks, point-of-sale devices, tablets, and mobile phones. The beneficiary account was opened under the PM JDY scheme and linked to the customer's mobile number in order to meet the requirements for UPI-based FI transactions. On newly formed bank accounts, banks began to route UPI-based transactions. In India, the urban population as of 2019 is little over 470 Mn, or around 34.47 percent. More than 65 percent of people live in semi-urban and rural areas, nevertheless, where there is less access to digital services than in big cities. Despite all the ordeals financial inclusion of women elevated dramatically after the implementation of above explained schemes.

Women account holders under PMJDY started getting a sum of Rs. 500 per month for three months to support them financially. As this money was being deposited into the bank accounts, the beneficiaries were encouraged to use the ATMs with RuPay cards, Bank Mitra, CSP to avoid crowding at branches and get maximum benefits financially. Rupay cards were also linked with other schemes like Kisan credit card and Pradhanmantri Mudra Yojna which indirectly benefited micro women entrepreneurs.

CHALLENGES OF TECHNOLOGY HANDLING AND FINANCIAL LITERACY AMONG WOMEN

There is a gender discrimination according on mobile access and usage in low- and middle-income nations because of socioeconomic and political reasons, as well as societal and cultural restrictions on the use of technology, are what essentially shape and affect the gender disparity. In the case of mobile phone use, technology has been demonstrated to be a source of gender empowerment for women, but some mobile phone features, such text messaging, are restrictive for women who lack particular reading and numeracy skills .United Nations Secretary-General, Kofi Annan stated in the World Summit on the Information Society, Geneva, 10 December 2003 about gender discrimination and technology " A lot of web-based information is simply not relevant to the real needs of people. And nearly 70 per cent of the world's websites are in English, at times crowding out local voices and views. There is a gender divide, with women and girls enjoying less access to information technology than men and boys. This can be true of rich and poor countries alike". Technology disrupts financial inclusiveness.

During the three-month lockdown last year, however, the Indian government moved quickly to declare and transfer 500 per month to women's Pradhan Mantri Jan Dhan Yojana (PMJDY) accounts. More importantly, this could happen since the government was aware of which accounts were held by women, which was made possible by the Centre's direct benefit transfer-PMJDY relationship. Unfortunately, only PMJDY account holders received the benefit, leaving out many additional worthy women due to a lack of gender-disaggregated data in the banking industry as a whole. More than half of India's poor women missed the cash transfers, according to estimates from the Yale Economic Growth Center.

Even while women hold 232.1 million PMJDY accounts, or 55 percent of all accounts, the issue is that not all poor women and not all poor people have PMJDY accounts. While 78 percent of impoverished women surveyed in the Financial Inclusion Insight research from 2017 reported having a bank account, only 23 percent said they also owned a PMJDY account.

(The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19, 2011-2021) Global Findex 2017 showed a significant advancement in PMJDY inclusion. In India, the proportion of women who said they had a bank account or another type of financial account increased from 26% in 2011 to 43% in 2014 to 77% in 2017. From 20 percentage points in 2014 to just 6 percentage points in 2017, the gender gap in account ownership was effectively closed. However, at 11 percentage points, the gender discrepancy in account utilization remained significant.

The gender perspective is rarely discussed when we talk about financial inclusion for women. Therefore, even though it is common knowledge that women entrepreneurs and employees generally face greater obstacles than men, the full degree of the inequality is still unknown. A first step toward bridging the gender gap in India is the argument for gender-disaggregated data in the banking and financial sectors.

The time and expense required to get to a bank outlet is one of the biggest obstacles to expanding women's access to and use of financial services. Although it is encouraging that an upcoming working paper from the Bank for International Settlements, The Fintech Gender Gap, finds that Indian women are just as likely to use fintech as Indian men, there are undoubtedly going to be significant regional and rural-versus-urban disparities in this finding. Granular data is useful in that situation as well. The situation is probably worse in places where women's mobility is severely constrained, like Uttar Pradesh, Bihar, Rajasthan, etc. Particularly in rural areas, women are hesitant to visit bank branches since male employees frequently treat them rudely there.

As discussed above, the challenges faced by women are many and many efforts are required to improve their financial inclusiveness.

The Role of Cashless Economy in Financial Inclusivity of Women

The emergence of innovation has acquired a positive change in the individual and economy too. Though a 100% cashless economy is not possible but if it rises 15% then it will mark a significant difference. To have this difference, there are few volunteers and government agents trying to educate and create awareness about the digital economy. This will provide women a chance to emerge as leaders in different fields with their own rights. The author through this study highlights the role of women in the cashless economy (Suganthiya, 2017). Cashless economy and digital transactions have seamlessly contributed towards India's economic growth in the recent years specially after the government took the decision of demonetization and unprecedented situation of covid 19. Undoubtedly the cashless environment has reduced the chances of illegal transactions, black money, theft, fall in corruption etc., and paved the way for financial inclusion of all the class, especially women. Now the women of India especially from middle class to lower class came out of their houses and started using ATMs, Online banking facility etc. The usage of technology has brought a positive change in the individual and economy as well. Previously women were dependent on someone who can help her to withdraw the cash or for any cash transaction they used to visit the bank. The government run schemes were not accessible to them, even if few of them were getting benefits, they used to stand in long queues to get financial benefits from government run schemes for women. According to (Bayero, 2015), awareness, consumer/User Value Proposition, and infrastructure were found to have strong significant relationships with financial inclusion while Business Model of financial service providers did not show any significant relationship with financial inclusion.

(Mudholkar and Prahbakar 2017) states the effect of cashless economy on the women associated with SHGs. This research shows that there have been positive changes in the attitude and behavior of SHG members. Women in India were living a life of financial exclusion before the pandemic. An unknown fear to accept the cashless or digital transaction was instilled into their mind and they always avoided using debit card, ATM or any other digital mode of payment, specifically the women living in suburban or villages. In a similar study conducted by Musa and others, linkage between cashless economic policy and financial inclusion has been studied. The study recommends that the Federal Government should pay adequate attention to the provision of infrastructural facilities across the country. A massive awareness campaign on the benefits of Cashless policy should be embarked upon by the Central Bank of Nigeria and all formal financial service providers and other stakeholders in the country for full and successful implementation of the policy, (Garba, 2015).

For emerging economies, it may well be that cash and digital payments play complementary and not alternative roles. This does not mean that such countries should renounce plans to become cashless economies, but that these plans would need to be backed by financial inclusion initiatives that promote equitable access to digital financial services, connectivity, and infrastructure. The alternative could mean adding digital exclusion to long-standing socio-economic exclusion (Srouji, 2020).

Financial Well-being of Women During the Pandemic

(Khan et al., 2020) in the paper titled 'Financial Well-Being of Working Women: Mediating Effect of Cashless Financial Experience and Digital Financial Self-Socialization" discusses the rise of new monetary ways of behaving in pandemic times, specifically increased cashless transactions, be it doing online shopping, trading in stock market, access to other financial information-all of which is crucial for the empowerment and prosperity of Indian women. Financial inclusion chiefly focuses on providing reliable financial solutions to the economically underprivileged sections of the society without having any unfair treatment. It intends to provide financial solutions without any signs of inequality.

(Murakami, 2020) in the paper titled 'The COVID-19 pandemic, remittances and financial inclusion in the Philippines' states that there are potential impacts of the pandemic on financial inclusion through the change in the flow of remittances. They show a substantial decline in remittances caused by the COVID-19 crisis may have an adverse effect on financial inclusion in the Philippines.

(Nandru et al., 2021) also discusses the effect of financial inclusion on financial well-being of marginalized street vendors has been studied through this paper whereby authors were trying to evaluate the factors affecting financial inclusion. One factor of financial literacy was found missing when the interview was conducted. To conclude, the authors added that several awareness programs should have been run by consultants or governments. It has been observed that for the economy to become cashless, people especially women have to be literate and aware about such issues.

In addition, Microfinance Institutions (MFIs) have also played important role in enhancing financial inclusivity. (Otiwu, 2018). Those people who are financially excluded class and want to upgrade their standard, can do it by adhering to the banking and financial services by tapping MFIs.

(Shivi Mittal, 2014), has also revealed that financial inclusion is getting accessed by rural community, especially women. The rich people become richer but poor community is taking care of, in terms of providing access to banking and financial services.

CONCLUSION

Through various literature we are trying to examine the causes of low rates of financial awareness in terms of cashless transactions among women. Our study is carried out in context to India. Apart from the attributes of financial inclusivity such as per capita income, GDP rate, loan process and interest rates; one factor that is financial literacy and awareness among people especially women is found insignificant. More and better financial services should be made available to the people of rural areas. Apart from various schemes which have been provided by GOI, it does not reach to a common man. Proper training and awareness programs should be run by government officials, so that people would know the importance of such schemes and they would get maximum benefit of it.

Another concern which raises questions is that when pandemic began and reached its peak in various countries like Nigeria, Ghana, North Korea including India, it impacted the financial performance of almost every sector, maybe it banks, industries but it affected common people most. Maybe it was men or women, everyone was seeking a solution relating to how to go cashless. Poor sections of the society were the biggest sufferers, especially women.

In the adverse time of Covid 19, women were most sufferers as discussed above, the unavailability of banking infrastructure in small towns and villages disrupted their usage of financial services. Secondly, mostly middle class and rural women in India restrain themselves from traveling alone to long distances which controlled their access to banks and ATMs and created hindrance in accessing the facilities and advantages of schemes run by GOI. Thirdly, the complex digital technology while using online banking systems and other money wallets too created a hindrance in accessing the available opportunities for financial inclusiveness.

Despite the initiatives and campaign to strengthen the financial inclusivity of women by financial agencies and GOI, the condition did not improve. Negligible difference has been found when it comes to women. All financial bodies in unification with accumulative effort might try to analyze its future implications, since the involvement of women in entrepreneurship and self-employability sector is elevating. The strong exposure towards financial inclusion can contribute to the growth of a country's economy as well.

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Chapter 14
Robotics Technology in the Tourism and Hospitality Sector in the Wake of the COVID-19 Health Crises

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ABSTRACT

During the global pandemic, the worldwide tourism and hospitality sector has affected severely, and robotics can be a good instrument for providing significant physical distance during the pandemic as humans avoid physical interaction. In this chapter, examination has been performed on whether it would be helpful or whether it will have adverse effects on using robotic systems to offer physical distance for the tourism and hospitality sector. The chapter further revealed that robotics technology builds a technological wall among tourists and staff, enhancing physical and emotional distance between them. Therefore, tourism and hospitality businesses need to augment robots with other technologies to promote social interaction and counteract the adverse consequences of complete distance.

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INTRODUCTION

Literature Review

The hospitality industry, like any other industry, is heavily influenced by information and communication technology (ICT). Recently, due to advances in artificial intelligence and robotics, hospitality businesses have started to use a wide range of service robots with different technical capabilities (robots that look like humanoids, zoomorphic or more), such as consultants, moderators, porters, kitchen staff, room servers, staff in the house, portraits and waiters (Fragapane et al., 2021). The service robots are used for repetitive, dirty, boring, and dangerous tasks such as providing information, cleaning floors, disinfecting, and providing room service (Seyitoğlu & Ivanov, 2020). Therefore, there are more and more studies on service robots in the hotel industry and tourism. A new coronavirus disease is causing an alarming pandemic (COVID-19) worldwide (Cucinotta & Vanelli, 2020). Many businesses, such as hospitality and tourism, have had a significant impact as individuals avoid interactions with others (Al-Qasem, 2021). According to the World Health Organization (2020), physical and social distancing slows the spread of a virus because there is no physical contact and space between the newly infected individuals (Karaman, Alhudhaif, & Polat, 2021). This study shows that service robots in tourism and hospitality can be used efficiently for physical distance. Tourism and hospitality are some sectors that require the most social interactions, personal touches, and physicality than any other industry. With COVID-19 classified as a pandemic by the World Health Organization (WHO), shutdowns have impacted this business. New restrictions have hampered it in terms of social distancing and travel bans. The tourism and hospitality industry increasingly depends on robotics, automation, and artificial intelligence (AI). Consequently, human presence in public places such as airports, hotels, transportation systems, and restaurants is decreasing. Human-to-robot connections are also increasing in business and society (Network, 2021). Robots and other advanced devices such as socially conscious robotics are commonly used in service industries, including tourism and hospitality (Network, 2021).

In the past, a crisis has brought about technical advances and advancements. As a result, the current COVID-19 scenario has taken place. Artificial technology (AI) developments have created new opportunities for automation, such as using robotics in the travel, tourism, and hospitality industries due to the current economic crisis (Gaur et al., 2021; Zeng et al., 2020). Artificial intelligence has enabled robots to become more socially aware and emotionally sensitive (Chuah & Yu, 2021; Yan et al., 2021). Intelligent robots can understand emotional signals and behave like humans. They use artificial intelligence (AI) to communicate with humans (Kumar et al.,

2022). These robots not only guide visitors and provide them with the information they need but also check guests in and out of hotels, clean airports and airport terminals, and provide consumers with groceries, luggage, and other necessities while keeping them safe (Jia et al., 2021; Pelau et al., 2021).

The concepts of hospitality and service are sometimes used simultaneously and falsely equated. There is a thin line between service and hospitality (Alamdari, 2017). Looking outward and making an effort to understand others is what hospitality is all about. Hospitality is the capacity to make others feel welcome, respected, valued, and engaged. Service is what you do for somebody, such as delivering a meal, while hospitality is how your behavior makes the visitor feel after giving the food or meal (Alamdari, 2017). Hotel employees must show that they care about the guest's pleasure and satisfaction when it comes to being deemed hospitable. Service and hospitality work together to create an unforgettable visitor experience. Still, excellent service cannot exist without the hospitality component, which is what creates an emotional bond that humans cherish. For example, smiling may significantly impact the host's mood and overall happiness (Alamdari, 2017). Even while robots are efficient at checking in and out visitors, answering inquiries, and providing room service, they cannot engage with guests because of the lack of emotion. As a result, everything in the hospitality industry revolves around how emotions are effectively perceived and reacted to. Even the most advanced robots can't actually prove a welcoming attitude since they're only computer programmes that can't form emotional relationships with people.

Crowded tourist areas are sterilized with drones (flying robots). Beneficial for normal and non-routine activities, UV sanitizers can identify high-risk areas that are difficult to detect with visual inspection (Afaq & Gaur, 2021; Ford, 2021). Regarding social distancing in public spaces like scenic beaches, drones are used in Hawaii, United States. It is becoming more common for visitors and locals to use automated vehicles (self-driving vehicles) to travel safely and efficiently (Englund et al., 2021; Kumakoshi et al., 2021). Above all, robots operate many hotels worldwide. One of these is the Henn Na Hotel in Nagasaki, Japan (Choi et al., 2021). The robotics carries luggage, guides visitors, operates, serves coffee, and cleans rooms. These robots can figure out where to go, eat and have fun. China robots cook and deliver food at Hema restaurant (Ma et al. 2021; Wang & Coe, 2021). High-touch industries such as travel, tourism, and hospitality are becoming high-tech through technological advances and robots (Bharwani & Mathews, 2021; Wu et al., 2021). The travel and hospitality AI industry is forecast to surpass $1.2 billion by 2026 and expand by more than 9.7 percent between 2021 and 2026 (Arc, 2022). The upheaval in Corona (COVID-19) has significantly impacted the hospitality and travel industry. As a result of COVID-19, the scope of robots in the industry has increased. It is projected that by the 2030s, a quarter of hospitality employment in the United States will be

automated (Network, 2021). Because of their effectiveness, robotics in tourism and hospitality can also profoundly impact the future of the tourism industry. Robots will replace tourist guides in the post-COVID-19 future (Gaur et al., 2021).

OBJECTIVES OF THE STUDY

The study aims to investigate whether it would be helpful or have adverse effects on the use of robotic systems to provide physical distancing in the tourism and hospitality industry. The article focused on how robotic technology creates a technological wall between tourists and staff, increasing the physical and emotional distance.

Research Methodology

For the accomplishment of study objectives, information and data were gathered from secondary sources. We used the Scopus database to review the literature in our study. To collect data from Scopus, we searched the words "hospitality" and "COVID-19" in their database. After that we reviewed the article related to the business & management subject. The literature has been reviewed extensively to acquire knowledge to examine the beneficial and harmful impact of robotics technology in the tourism and hospitality sector during the Covid-19. The different methods and sources for collecting literature and information have been used like; Internet blogs, news stories, online websites, and other secondary sources.

Framework and Discussion

The discussion portion of the study was divided into two major sections based on the objectives. The first part has highlighted the benefits of robots during the pandemic as long-distance physical service providers, showing some benefits and examples of robotic technology in the hospitality industry during the Covid-19. The second part provides an overview of how robotic technology creates a protective buffer between visitors and workers in the tourism and hospitality sector during the Covid-19 and some adverse effects of advanced technology such as robotics on visitors and workers in this industry.

The Advantage of Robots as Physical Distance Service Providers During the Pandemic

To enforce physical distancing, tourism and hospitality businesses could use robots. For example, robots, packaging and food delivery robots, free-standing vehicles,

delivery drones, and others will reduce physical contact and potential illness among visitors and staff. The Covid-19 pandemic has demonstrated that robotic technology can be used efficiently and effectively to clean or disinfect visitors and provide meals and medication (Wang & Wang, 2021). For example, food Delivery Company "Meituan Dianping" introduced robots in some of its partners' restaurants in Beijing in February 2020 to transport food to caterers and customers waiting for orders. Restaurants have limited ability to fulfil an order accurately and quickly. Thus robots play a large role in the widespread movement of items from stores and warehouses to trucks and customers (Fusté-Forné & Jamal, 2021; Javaid et al., 2021). In addition, cleaning and meal preparation is performed by robots (Aliasghari et al., 2021; Wang & Wang, 2021). Suppose a visitor is ill and must stay in the room under quarantine. In this case, hotels can supply robots with groceries, towels, and other products without jeopardizing the health and safety of employees (Di Lallo et al., 2021; Kim et al., 2021). Seclusion. Robotics are also helping nurses provide meals to patients during the epidemic (Chauhan, 2021; Manikandan et al., 2021). Caregivers must wear protective clothing for at least 10 minutes. Thus, robots reduce health risks for medical staff and take time to complete important medical tasks (Sierra Marín et al., 2021).

The Robots as Technological Protection Between Visitors and Employees

The robots form a digital buffer between tourists and the tourism and accommodation staff (Carlisle, Ivanov, & Dijkmans, 2021). As a people business, tourism mainly relies on the human team to deliver services (Seyitoğlu & Ivanov, 2021). Empathy, emotional intelligence, attractiveness, and efficiency are essential factors influencing consumer behavior, service quality, and standard of care (Yoon & Lee, 2021). Therefore, the tourism and hospitality industry's automation and robotization could wipe out the consumer experience's crucial aspects (Ivanov et al., 2020; Lee et al., 2021). However, in pandemic scenarios, the technology shield that robots create can be considered as physical contact is avoided (Seyitoğlu & Ivanov, 2021; X. V. Wang & Wang, 2021). Robots should be kept clean to avoid infection (Ramalingam et al., 2020). Tourism and hospitality businesses must know and respect hygiene procedures to protect the health of their customers and employees (Awan et al., 2020). Service robots can help maintain a high level of physical segregation from a managerial perspective, helping provide safer services to visitors during a pandemic (Chuah et al., 2022; Khaliq et al., 2022). It can be widespread in the post-viral world. People are becoming more focused on safety, security, and security, which can be one of the key elements affecting visitors and tourism/hospitality providers (Tasnim et al., 2022).

However, the use of robotic systems can create a psychological barrier between visitors and residents in a place by reducing human connection (Follmann et al., 2021). If you become solely involved with machines, you may lose the human touch and social support, leading to emotional difficulties such as melancholy and anxiety. On the other hand, the pleasant engagement of guest tourists can lead to positive intercultural behavior, friendly development, social interaction, and psychological changes (Fusté-Forné, 2021; Kim et al., 2021). Therefore, management needs to establish techniques to manage the relationship between visitors and hosts, especially when visitors mainly interact with robots (Hou, Zhang, & Li, 2021). For this reason, robotic technology can be deployed by increasing distances during the pandemic and avoiding virus transmission to visitors and workers in physical conditions (Bokolo, 2021; Kumar et al., 2021). However, it can be psychologically damaging as there is no social interaction between individuals (Bokolo, 2021; Kumar et al., 2021). Therefore, there is a need to complement the service robots with other information and communication technologies to minimize the negative impact of physical separation and to connect people and reduce the psychological gaps between them (e.g., video chat, social media, and video conferencing) (Li et al., 2022). Businesses and locations must use technology strategically to compensate visitors, employees, and residents for the physical distance involved in their social connections.

CONCLUSION

The robots can be used well, but they can compromise socio-psychological distance to ensure the physical distance between visitors and hosts. As a result, they can undermine the hospitality and tourism service sector as people do not engage with visitors. This may lead to the development of a new tourism service system, called physically and socially remote, which mainly relies on robotics and technology to provide tourism services. The ongoing pandemic (COVID-19) may transform certain businesses while others continue to rely on the current system and human service providers. The system that will lead to more competition in the tourism and hospitality industry can be predicted early. Nevertheless, both service providers and customers must be adjusted to the new service system (remote service socially and physically). The future study could focus on consumer and worker perceptions of using robots for physical distancing and its impact on quality tourism and hospitality services.

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