The impact of digital job resources on employees innovative work behaviour: The serial mediating role of digital engagement and digital leadership

By

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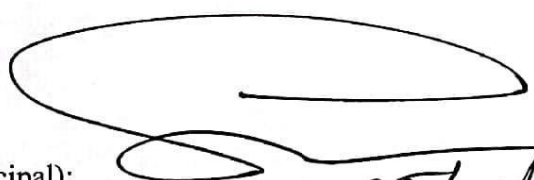NUST Business School (NBS)

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ABSTRACT

Drawing on Job Demands-Resources (JD-R) theory, this study aimed to examine the impact of digital job resources, specifically digital training, digital communication, digital task variety, and digital job autonomy, on digital employee engagement. Furthermore, it investigated the influence of digital engagement on digital leadership and the influence of digital leadership on innovative work behaviour. Lastly, the study examined whether digital engagement and digital leadership mediate (serially) the relationship between digital job resources and innovative work behaviour. The data were collected from full-time technological professionals working in Pakistan using snowball and purposive sampling techniques. A total of 307 samples were used for the final data analysis. The study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0 to test the study hypotheses. The results suggest that digital job resources, specifically digital communication, and digital task variety, influence technological professionals' digital engagement. Additionally, digital engagement has a positive effect on digital leadership, which in turn increases technological professionals' innovative work behaviour. Importantly, digital engagement and digital leadership mediate (serially) the relationship between digital resources (digital communication and digital task variety) and innovative work behaviour. Surprisingly, digital training and digital autonomy neither directly affect digital engagement nor indirectly influence innovative work behaviour. Firstly, previous studies have primarily focused on antecedents of innovative work behaviour, such as individual characteristics and organizational environmental factors. Little to no effort has been made to investigate the impact of digital job resources as antecedents of innovative work behaviour. Secondly, only a few studies have reported digital engagement from the employees' perspective. Thirdly, there is a dearth of studies investigating the relationship between digital engagement and digital leadership. Lastly, the mediating role of digital engagement and digital leadership between digital resources and innovative work behaviour is absent from the academic literature. This study addresses these gaps.

CHAPTER 01

INTRODUCTION

1.0 Background of study

The rapid wave of digitalization worldwide has led to significant transformational changes globally. Consequently, digitalization has become the top priority of every industry and organization to survive in this technological wave. To meet their digital ambitions, organizations need to adopt technology at a much faster pace with the valuable contribution of their employees (Hajro et al., 2022). However, digital transformation is not easy. It requires significant and consistent contributions from each employee in the form of innovative ideas for products and services, as well as for the deployment of different creative systems and processes. Thus, innovative behavior is one important factor that contributes to organizational digital transformation (Warner & Wäger, 2019).

Innovative work behaviour is when employee exhibit out of the box behaviour at work that involves changing the processes and introducing new ways of doing work (AlEssa & Durugbo, 2022). Employees' innovative work behaviour is vital as it helps the organizations to operate in highly competitive environment. It allows organizations to stay sustainable and competitive in business (Li et al., 2019). There are many positive outcomes that result from employees' innovative work behaviour, these includes organizational performance, organizational competitiveness, and sustainability of the business (Amankwaa et al., 2019; El-Kassar et al., 2022). Organizations help to grow and develop their presence in market with the help of this innovative work behaviour of employees (Akram et al., 2020). In addition to this, there are other individual employee outcomes as a result of innovative work behaviour, which include higher job satisfaction, greater productivity and increased wellbeing (Jankelová et al., 2021). Innovative work behaviour also helps the employee on the job, by improving their problem-solving abilities and their capability to deal with risky situations (Al-Ghazali, 2021; Jankelová et al., 2021).

Innovative work behaviour depends on digital capabilities as it requires a deeper understanding of the digital technologies at work and the knowledge of creating value through digital skills (Santoso et al., 2019). Hence, digital leadership is a significant factor that helps in improving

innovative work behaviour. A digital leader is a person who possess knowledge on how to exploit digital resources at work for the best of organization and the work itself (Møller et al., 2022). They keep up with sudden changes and develop a digital culture. With the use of the digital platforms, digital leaders enable creating actual value for the business. Therefore, digital leadership is vital for organizations nowadays (Benitez et al., 2022; Carvalho et al., 2022). Not only managers but employees are expected to perform the duties of a digital leader (Katanic, 2021).

Additionally, the norms of work are changing. For instance, the hierarchy within organizations is collapsing and there is enough autonomy and freedom demanded by employees nowadays (Lubis et al., 2020). Therefore, employees in the workplace now should not be relying on leaders to guide them through the process and work issues. It is now the time that employees themselves become the leaders and drive the digital transformation at workplace. So, employees are responsible to act as digital leader to achieve positive individual and organizational outcomes (Cortellazzo et al., 2019).

To develop digital leadership among employees, organizations need to consider the factors that help them to develop the characteristics of a digital leader. Hence, employees' digital engagement can be an important factor that nurture their digital leadership capabilities (Rizky et al., 2021). Organizations needs to adopt practices and resources that help employees enhance their digital engagement. The more involved and engaged an employee is digitally the better the employee digital leadership attributes. Employees' digital engagement results in improved skills competencies for digital technologies due to their physical, cognitive and emotional connection with the digital tasks and responsibilities they are involved (Restu et al., 2022).

So, how to increase employees' digital engagement? The digital resources including digital training, digital communication, digital task variety and digital job autonomy can be helpful in increasing employees' digital engagement (Mazzei et al., 2016). These digital resources usually considered as agile practices to achieve higher innovation (Malik et al., 2021). Digital job resources help employees adapt to the changing circumstances and technology in the most effective way possible, which helps them in their innovative behaviour (Benitez et al., 2022). Also, these perceived as the job resources to increase employees' level of engagement and other outcomes, such as innovative work behaviour (Ok & Lim, 2022).

An annual report by Cognizant (2021) stated that 93% of the corporate employees think that it is crucial to be digitally savvy today in order to perform well tomorrow. Additionally, a recent survey conducted by European commission reported positive insights from people regarding digitalization in transforming their lives. 67% people reported improved quality. 75% reported that it improved the economy as well and around 64% of these surveyed respondents reported that digitalization had a positive impact on overall society (European Commission, 2017). These statistics show that employee today value being tech savvy and crave for digital leadership abilities within them in order to keep up with the pace of rapidly evolving world.

1.1 Context

Considering the situation of Pakistan with respect to digital transformation its growth is still stagnant (Khan et al., 2023). Despite of all the digital visions created a picture of digital Pakistan still seems vague (Khan et al., 2023). There are a frequent number of plannings done each year however there is lack of implementation (Jamal, 2023). Companies within Pakistan need to realize that this is the need of hour for digital transformation to progress forward on the global front. As per an article in Express Tribune it states that the digital transformation in Pakistan is projected to generate approximately 9.7 trillion additional revenues by 2030, contributing around 19% to the country's economy (Hanif, 2021). However, such a transformation can only be achieved if individuals contribute equally. By enhancing their digital intelligence and fostering a digital culture, employees in the corporate sector can promote digitalization trend throughout the country (Mwita & Joanthan, 2020). This will not only offer and opportunity for growth for the country but also contribute towards the vision of a digitalized Pakistan by 2025. Another essential component for this digital transformation is continuous innovation and the effective utilization of digital resources through the development of new ideas, processes and procedures (Mughal, 2020).

Innovation is a concept of universal significance. Prior studies have emphasized that innovation leads to successful economies and drives high growth (Galang, 2021). According to the Asian Development Bank (ADB) 53% of developing countries in Asia have reported rate of innovation (Khatiwada & Arao, 2020). This suggests that Pakistan, as a developing country in Southeast Asia, falls in the 53 brackets. However, in the Global Innovation Index rankings, Pakistan holds the 87th position out of 132 countries, indicating room for improvement to achieve greater economic and financial stability. Therefore, the present research is both

relevant and timely as it seeks to identify digital resources that can enhance employee digital engagement and digital leadership, ultimately resulting in increased innovative work behaviour.

1.2 Research gaps

The present study aims to contribute to the existing body of literature by addressing several research gaps specifically in the following ways:

1.2.1 Serial mediation

This is amongst the first studies that investigated the serially mediated role of digital engagement and digital leadership in innovative work behaviour, which has been overlooked in existing literature. Previous studies have observed that digital leadership and digital engagement have been studied separately as standalone constructs when investigating employees innovative work behaviour (see Benitez et al., 2022; Sifatu et al., 2020; Borah et al., 2022; Erhan et al., 2022). However, there is a lack of research that empirically tests both digital engagement and digital leadership in serial mediation model with respect to employees innovative work behaviour (Khan et al., 2020). This present study fills this gap.

1.2.2 Antecedents of innovative work behaviour

Limited research is available on digital job resources, such as digital training, digital communication, digital task variety and digital job autonomy and their relationship with digital engagement, digital leadership, and innovative work behaviour. Previous studies have primarily focused on organizational motivating factors (Saether, 2019), leadership in organizations (Khan et al., 2020), and individual employee characteristics (Dar et al., 2022) to drive innovative behaviour among employees. Although some studies have examined organizational practices to improve employee innovative behaviour, these studies are limited to high involvement practices and their direct relationship with innovative behaviour (Mehmood et al., 2022). This present study fills this gap by examining the impact that digital resources (digital training, digital communication, digital task variety, digital job autonomy) have on various outcomes (digital engagement, digital leadership, and innovative work behaviour).

1.2.3 Relationship between digital engagement and digital leadership

There is a paucity of research exploring the impact of digital engagement on digital leadership. Previous studies have mainly focused on the influence of digital leadership on employee engagement (Restu et al., 2022; Rizky et al., 2021). However, based on the JD-R theory, this study argues that digital engagement is a crucial precursor to an employee becoming a digital leader. Consequently, the aim of this study is to investigate the reverse relationship between these constructs and determine whether digital employee engagement leads to digital leadership. This research makes a significant academic contribution to the JD-R theory and the existing literature on this topic.

1.3 Problem statement

According to the Global Innovation Index ranking, Pakistan holds the 87th rank out of 132 countries (Dutta et al., 2022). Although the ranking surpasses previous years standing, it remains unsatisfactory. The deficiency of leadership capabilities and digital job resources is regarded as one of the factors hindering the innovation at organizational level and hindering digital transformation (Gilliard, 2020a). Conventionally, employees serve as the primary contributor to a firms innovativeness (Albassami et al., 2019). Despite its importance, only limited efforts have been devoted investigating the digital job resources that could enhance employees innovative work behaviour (Mansour et al., 2022). This research is pertinent because it empirically examines the impact of digital resources (digital training, digital communication, digital task variety and digital job autonomy) on employees' innovative work behaviour through digital engagement and digital leadership. The findings of this research can have significant implications for the digital Pakistan vision 2025, as it emphasizes the importance of digital job resources in promoting innovative work behaviour. Overall, this can contribute to the digital transformation of Pakistan and improve its global innovation ranking in long run.

1.4 Research objectives

1. To investigate the effect of digital training on digital engagement among technological professionals
2. To investigate the effect of digital communication on digital engagement among technological professionals

3. To investigate the effect of digital task variety on digital engagement among technological professionals

4. To investigate the effect of digital job autonomy on digital engagement among technological professionals

5. To examine the relationship between digital engagement and digital leadership of technological professionals

6. To examine the relationship between digital leadership and innovative work behaviour of technological professionals.

7. To investigate the mediating role of digital engagement and digital leadership between job resources (digital training, digital communication, digital task variety, digital job autonomy) and innovative work behaviour of technological professionals.

1.5 Research questions

1. Does digital training influence digital engagement among technological professionals?

2. Does digital communication influence digital engagement among technological professionals?

3. Does digital task variety influence digital engagement among technological professionals?

4. Does digital job autonomy influence digital engagement among technological professionals?

5. Does digital engagement effect digital leadership of technological professionals?

6. Does digital leadership effect innovative work behaviour of technological professionals?

7. Do digital engagement and digital leadership mediate the relationship between job resources (digital training, digital communication, digital task variety, digital job autonomy) and innovative work behaviour of technological professionals?

1.6 Operational definitions

1.6.1 Digital training

Digital training refers to the "efforts made by companies to improve employees' digital skills, digital knowledge, digital competencies, and digital capabilities so as to achieve the organization's objectives and produce expected results" (Chikazhe & Nyakunuwa, 2022, p. 296).

1.6.2 Digital communication

Digital communication refers to "the ability to communicate and collaborate with others using digital technologies and media via discussion" (Na-Nan et al., 2019, p. 1469).

1.6.3 Digital task variety

Digital task variety refers to "A job characteristic that involves performing diverse online tasks by using different digital skills and digital talents frequently" (Lan & Chen, 2020, p. 4).

1.6.4 Digital job autonomy

Digital job autonomy refers to "the degree to which the job gives the worker freedom, independence, .and discretion in scheduling work online and determining how he will carry it out digitally" (Hackman et al., 1975, p. 59).

1.6.5 Digital engagement

Digital engagement refers to "the active, work-related positive psychological state operationalized by the intensity and direction of cognitive, emotional, and behavioural energy to be expended on digital platforms and using technology" (Jesuthasan, 2017, p. 46)

1.6.6 Digital leadership

Digital leadership refers to "the ability of individuals to lead others, teams or entire organisations to give full play to digital thinking by leveraging digital insight, digital decision-making, digital implementation and digital guidance to ensure that their goals are achieved" (Peng, 2021, p. 7).

1.6.7 Innovative work behaviour

Innovative work behaviour refers to the "Individuals' behaviours directed toward the initiation and intentional introduction of new and useful ideas, processes, products, or procedure within a work role, group or organization" (De-Jong, 2007, p. 19).

1.7 Significance of study

1.7.1 Theoretical significance

This study proposed a serial mediation effect of digital engagement and digital leadership on the relationship between digital job resources and innovative work behavior. This research has specific theoretical significance, as it focuses on digitalization aspect in organizations by focusing on employee behavior. There is very limited literature in the past that have conducted research on digital leadership within an organizational context (Chatterjee et al., 2023). Moreover, the concept of digital engagement and digital job resources is new in this research. So, this study provides a new path for researchers to explore deeper regarding the concept of digital engagement of employees, as previously this concept is considered relevant to customers only (Chaker et al., 2022). Lastly this study is significant as it is the first study linking innovative work behavior with digital resources at work. The concept helps to elaborate how organizations can make employee the advocate and leaders for digital transformation at workplace (Bansal et al., 2023).

1.7.2 Practical significance

Through the insights of the findings of this study, managers will be able to understand how digital leadership within an employee leads to more innovative work behaviour (Benitez et al., 2022). Thus, these digital leaders at workplace will be able to drive the innovation in organization. Since, employees with digital leadership capabilities are more technically able and they capitalize on the emerging and upcoming trends. Therefore, with the help of updated information, market trends, ability to envision a future for the organization and ability to lead a team digital leaders can be the drivers of innovation at workplace (Schepers et al., 2022). This study will provide manager with the necessary guidance on how to transform their employees to digital leaders.

Moreover, this research will help managers understand that by providing the digital resources to employees and developing digital leadership among them. Digital resources have also been referred to as digital workplace tools. These resources are the technologies involved to make better employee experience at work and enhance efficiency. For instance, ERP software systems throughout organization or SAP system in organizations (Seeber & Erhardt, 2023). Other examples of digital job resources include online meeting applications like zoom and

digital dashboards for employees like Helpscout and Stripe etc (Stojanovic, 2022). Employees will be well equipped and more knowledgeable regarding the details and the issues with the digital systems at work. Through the digital engagement, employees can analyse the system better that they would know the digital systems strengths and weaknesses. With the help of this information, they would know how to leverage its strengths and reduce its complications. Employees can ensure that the digital platforms have enough capability to keep the digital assets of the company safe. Additionally, these digital leaders with the up-to-date knowledge and their understanding regarding the system can work on the system efficiency as well. By the findings organizations would know how digital leaders in organizations can find more innovative ways to improve communication and interconnected system at work (Aderibigbe, 2021). This innovation can be reflected in improving the digital platform in its effectiveness and efficiency and develop an advanced system for digital communication itself. This study would help organizations determine the digital resources through which they can achieve rapid digitalization.

World is rapidly moving towards digitalization and industry 5.0, thus a faster pace of digitalization is required to compete and survive. There are various opportunities available in the world that can cultivate human development and boost the countries innovation and entrepreneurship level. But Pakistan is not catching up with the pace of world if we refer to adopting these cutting edge technologies and getting a hold of digitalization (Khan et al., 2023). Not only this but a study state that Pakistan is lagging towards the digital transformation journey as compared to other countries(Jamil, 2021).

1.8 Scope of study

This research examines the relationship between digital job resources (digital training, digital communication, digital task variety, digital job autonomy) and the employee innovative work behavior through the mediation effect of digital employee engagement and digital leadership. This study is focusing on full-time employees that have day to day involvement of technology in their work tasks. These employees are based in Pakistan. Respondents mainly belonged to the following cities: Lahore, Karachi, Multan, Faisalabad, Islamabad, Rawalpindi including other districts in various locations of Pakistan. Data is collected in the form of survey questionnaire.

1.9 Organization of thesis

Previous chapter has explained the background of the study, along with the details like its scope, significance, research questions and objectives. Following this Chapter 2 comprises of the review of literature from past and recent studies that will elaborate our conceptual understanding regarding the variables utilized for this research. Afterwards the methodology section will be covered which will elaborate starting from the research design, methods used and the questionnaire administration etc. In addition to this the measures taken for each variable will be explained separately. Chapter 4 will be followed after methodology; this chapter will focus on data analysis and results. It begins by demonstrating what software and techniques were used for data analysis with reasoning. Then the hypothesis testing is explained in detail. After the results section, we started with the last chapter: chapter 6. This chapter is dedicated to the discussion of the findings and will justify the results obtained with the help of previous literature. This chapter ends with limitations, future direction, and theoretical and managerial implications of the study.

1.10 Chapter summary

This chapter explains the introduction of the research with a brief overview of the background of study. In addition to this it identifies the research objectives, research questions, scope of study, significance of study and the contextual overview. This study aims to explore the relationship between digital job resources (digital training, digital communication, digital task variety and digital job autonomy) with the employee innovative work behavior by the serial mediation effect of digital engagement and digital leadership.

CHAPTER 02

LITERATURE REVIEW

2.1 Chapter introduction

This chapter starts with the conceptualization of the variables under study i.e., digital training, digital communication, digital job autonomy, digital task variety, digital engagement, digital leadership, and innovative work behavior. Following the conceptualization, this chapter would explain the theory which is the basis of this research (i.e., job demands resources theory). After explaining the theory, we will be focusing on the relationship between variables and hypothesis development. This chapter ends with a conceptual framework derived from the hypothesis proposed.

2.2 Conceptualization

2.2.1 Digital training

Training is old concept, it emerged post World War 2, initiated by the industrial revolution. The concept of training was first used by Torraco & Swanson in (1995) for the technical training of people to utilize them for greater good of the industry. This study has used digital training as a resource for employees at workplace. This study is adopting the definition for digital employee training is as "Efforts made by companies to improve employees digital skills, digital knowledge, digital competencies, and digital capabilities so as to achieve the organization's objectives and produce expected results" (Chikazhe & Nyakunuwa, 2022, p. 296). In this research the focus is on employing three different concepts with respect to digital employee training. These arep the organizational support for digital training, employee feelings about digital training and employee satisfaction with the digital training (Elsafty & Oraby, 2022; Schmidt, 2004). There are diverse types of employee training as well, these include, on the job training, job instruction and formal training. In addition to these types there are different ways of training employees as well, these are simulations, eLearning, roleplaying, coaching, and mentoring and much more, all result in different employee perceptions as per their individual interests (Chikazhe & Nyakunuwa, 2022; Ozkeser, 2019).

Previous researchers have rarely discussed the concept of digital training independently. However, one study conducted by Yaroshenko et al., (2020) elaborated digital training with respect to school teachers. This digital training has been highlighted with respect to digital literacy and the conscious use of ICT by these school employees. The study emphasized on the importance of this digital training for teachers in order to incorporate digital learning in students. Additionally some scholars have researched on the effectiveness of training in the digital era and found that digital training if administered through right means can result in reduced anxiety and depression among people (Mrazek et al., 2019). The concept of digital training can be explained with the context of digitalization and the onset of industry 4.0. It elaborated that digital training is crucial for employees to gain technical ineptness and technical competencies. The researchers pointed out the fact that digitalization might result in unemployment of human labour due to automation of tasks, thus focusing more on digital training of personnel is a prerequisite to moving in another industrial revolution (Popkova & Zmiyak, 2019).

2.2.2 Digital communication

Digital communication is defined as "The ability to communicate and collaborate with others using digital technologies and media via discussion" (Na-Nan et al., 2019, p. 1469). Digital communication has been reported be associated with the individual wellbeing by enhancing the social connectedness among them. However, it varies in individuals, as some may feel anxiety and negative emotions due to excessive communication. Some of the digital communication tools may include video conferences, social media usage and messengers. Digital communication plays a significant part in knowledge management in organizations where employees are either diverse or face hindrance collaborating via face-to-face means. Not only this digital communication can result in greater e-learning and technology adoption as well (Pokrovskaia et al., 2021).

Previous studies have focused on digital communication as the means for interacting with other fellow colleagues. These studies have regarded employee digital communication means like teams, zoom, google meet, email, and other tools. However, most of the researchers have mentioned digital communication as ineffective when compared to other forms of normal face to face daily interaction between employees (Khan et al., 2022; Sharbaji & Wahl, 2021). Nevertheless, it can be stated with much emphasis that today organizations are mostly global,

and they operate in such a way that either all the employees are working on hybrid mode or most of these employees work from home. Not only this but these global organizations have employees from all around the globe and it is necessary for employees to collaborate from the work colleagues that might be working from the other corner. Most of these interactions are possible through the use of intranet channel (Kick et al., 2015). However not all of them are effective enough. Some of these channels result in distortion resulting in disturbance to carry out the work effectively. Moreover, previous study Fronzetti Colladon et al., (2021) who worked on digital communicated found that a better platform usability and user interface enables better engagement and performance from employees as well.

Today employees value the business technologies more than ever before. Employees perceive these business technologies and tools to be effective and more likely to produce positive results. A survey reported that 85% of employee believe that the collaborative technological tools that businesses employ, allow employees to have a deeper focus (He, 2023). Thus, a greater focus towards work depicts a greater engagement towards the tasks as well. Moreover, with greater availability of collaborative tools, employees feel equipped from the organization, which helps them with high level of productivity.

2.2.3 Digital task variety

One other high-performance practice that has been cited in previous studies is offering task variety to employees to enhance their engagement. Task variety was first used in the job characteristics model introduced by Hackman & Lawler in (1971). This study will be using task variety as a practice offered by organization and therefore as a resource but in a digital context. So the definition that is adapted for the study is "A job characteristic that involves performing diverse online tasks by using different digital skills and digital talents frequently" (Lan & Chen, 2020, p. 4). There are two types of task variety. Concurrent and non-concurrent task variety. Concurrent task variety refers to "Performing another task concurrently with the focal one". While non-concurrent variety refers to "Performing another task independently from the focal one" (Avgerinos & Gokpinar, 2018, p. 1369). It is perceived differently by different employees as per their understanding.

Previous research on task variety provided to employee has resulted in improved productivity of employee, better cognitive thinking and well-being of employee. It has been argued that

when work becomes repetitive employee get frustrated and produce work that might be full of errors. Job enrichment often results in better task performance (Geue, 2018). Thus, organizations came up with this form of job enrichment i.e., task variety. In task variety employee are provided with different tasks that might be of use to these employee and help them develop better skills (Avgerinos & Gokpinar, 2018). Nowadays these digital tasks are not even considered separate standalone tasks to be performed rather they are mostly associate with different variety of skills. Therefore, the concept of enrichment within a person's job by providing employees variety of tasks to be performed by using multiple skills (Lennon et al., 2023). Whereas the introduction of advanced information systems in organizations has provided companies the opportunity to offer employees with digital task variety to enhance their digital skills. Therefore, it is operationalized as a job resource (Fischer et al., 2023).

2.2.4 Digital job autonomy

Employee autonomy was first coined by Hackman et al., (1975). They defined the term autonomy for employees, and this research adapted it by including the use of technology as "The degree to which the job gives the worker freedom, independence, and discretion in scheduling work online and determining how he will carry it out digitally" (Hackman et al., 1975, p. 59). This definition is recently referred by Nie et al., (2023) in his study on job autonomy. There are three types of job autonomy: decision-making, scheduling and method autonomy. It has been argued by some researchers that with the increased use of information communication technology in organizations, the work structure is changing, and employee work patterns are shifting (Gerten et al., 2019; Zhao & Wu, 2023). The reason behind the changing work schedules is due to the decentralization as a result of more information communication technology. Every employee is perceived as independent when it comes to performing their work tasks. Moreover, since there is a greater check on employees through the digitalization and artificial intelligence, therefore the supervision by humans has reduced in the past years.

This research has adapted the definition of autonomy in the context of digitalization (Meijerink & Bondarouk, 2023). Where employee will have the necessary empowerment to make digital decisions and decide their own digital work task. Autonomy is adapted with reference to three different dimensions; work scheduling, decision making and work methods autonomy for employees working on digital platforms (Farid et al., 2021; Morgeson & Humphrey, 2006).

Analysis of the results of a survey conducted on employees resulted in the findings that around 61% employees in workplace are seeking digital autonomy rather than flexibility (Reisinger & Fetterer, 2021). This survey helps us look closely towards autonomy as a job resource for the employees. Where some researchers have proved that providing job autonomy to employee leads to better results and greater productivity (Park, 2018; Shobe, 2018). Similarly, other studies have proved that with job autonomy comes a lot of responsibility and challenges and therefore more perplexing work for the employee (Muecke et al., 2020).

2.2.5 Digital engagement

Engagement is a wide term that means the state of being involved. Whereas employee engagement has been reported to comprise of three elements cognitive engagement, emotional engagement, and behavioural engagement. This term of employee engagement was first introduced by Kahn in (1990). He defined engagement as "The simultaneous employment and expression of a person's 'preferred self" (p. 700). The concept of digital engagement of employees adapted is defined by Shuck et al., (2014) but here the element of digitalization is added, as is stated by Jesuthasan (2017) as "The active, work-related positive psychological state operationalized by the intensity and direction of cognitive, emotional, and behavioural energy to be expended on digital platforms and using technology is called digital engagement" (p. 46). Thus there are three predictor of digital engagement within employees, these are enablement of employees to use digital platforms, their social, emotional and physical energy to use these technologies and their discretionary effort to use internet technologies (Jesuthasan, 2017).

The term of digital engagement is slightly different from simple engagement in a way that simple employee engagement can be enhanced by rewards, compensation, and leadership. However digital engagement is enhanced by specifically the use of digital technologies and the practices at workplace play a huge part in this engagement (Fisher, 2020). This is the reason developing this digital engagement via unique digital practices that are high performing for employees and help them become more engaged (Jesuthasan, 2017; Johnston, 2023). Digital engagement is a term that has not been widely used by previous studies. However, when the term of digital engagement is seen, the researchers are often referring to the customer digital engagement or youth digital engagement (Chaker et al., 2022; Layte et al., 2023). Which means the attraction of customers towards the brand and the social media pages of the brand

(Eigenraam et al., 2018). In this study we will be first using the term of digital engagement from the perspective of employees which would reflect the involvement of employee with the digital platform which is at use by the organization (Kokshagina & Schneider, 2023).

2.2.6 Digital leadership

Leadership is known as a process of influencing other and developing a personality such that you gain followers. Leadership has been defined in the past as "Leadership is a process of influencing the activities of an organized group in its efforts toward goal setting and goal achievement" (Stogdill, 1974, p. 3). In other words it is a simple process that consists of influencing others to achieve goals and direct the effort of followers towards an aim (Bryman, 2013). However since the culture of workplace is changing and demanding new styles of leadership with different qualities (Petrucci & Rivera, 2018). There is another type of leadership that emerged in the late 2005, after the 4th industrial revolution i.e., digital leadership.

Digital leadership term has been used by various authors over the past researches (Duan, 2005; Narbona, 2016; Oberer & Erkollar, 2018; Peng, 2021). However not all these authors conveyed the same meaning regarding digital leadership. The concept of digital leadership that this research has adopted is based on digital age and the emergence of new leadership skills that are required for this age. It is defined as "Digital leadership is the ability of individuals to lead others, teams or entire organisations to give full play to digital thinking by leveraging digital insight, digital decision-making, digital implementation and digital guidance to ensure that their goals are achieved" (Peng, 2021, p. 7). Whereas a digital leader is "a person that prioritize the methodical growth of a digital learning culture throughout the company" (Sağbaş & Erdoğan, 2022, p. 18). Some scholars have mentioned digital leadership as "A strategic mindset that leverages available resources to improve what we do while anticipating the changes needed to cultivate a school culture focused on efficacy" (Sheninger, 2019, p. 19).

Traditionally it is considered that leaders are those individuals or entities that have the power to lead, are goal oriented and influence others. However, this new concept of leadership entails the concept of innovation and agility in work (Karippur & Balaramachandran, 2022). Previously researchers have also regarded organizations as digital leaders. When these studies relate organizations with the digital leadership they refer it to as "The organizations that have

a clearer holistic vision, digital strategy and achieve higher returns from their digital transformation projects" (Karippur & Balaramachandran, 2022, p. 2). Most of the studies have related digital leadership with digital transformation. As it is expected from the digital leaders to guide through the process of digital transformation with the knowledge, experience, and technology integration skills. In addition to this digital leader are considered the ones that will drive innovation with the help of their skills and abilities with new technologies. When an enterprise-wide digital leadership is considered, several studies have highlighted different capabilities of companies that makes them effective digital leaders. These include certain leadership attributes, organizational areas to explore, strategic priorities and digital governance mechanism for exploitation (Karippur & Balaramachandran, 2022).

Recently researchers have developed a matrix that appropriately defines the place of a digital leader with respect to the "concern for people" and "concern for technology". This matrix is known as leadership 4.0 matrix. It consists of four types of leadership depending upon the situation and context in which it is occurring. This includes social leader, freshman leader, digital leader and technological leader. In this matrix a digital leader is the one "The type of leader who focuses on ability to understand how technology impacts people and the organizational model is aligned with human nature" (Oberer & Erkollar, 2018, p. 8). It is recognized as the most productive leader.

With the rapid digitalization and increasing work in new technologies. It is prevalent that digital leadership will persist at this time. Every organization would have access to these opportunities. However, the one thing by which they can sustain competitive advantage is through the digital leaders. The leaders that have the necessary tools to cater the digital transformation in workplace. Digital leaders as individuals are supposed to constantly examine the IT and digitalization system at workplace and better derive insights that how best to leverage these capabilities of organization. The basis of the entire digital system of a company is held by a digital leader, as the digital leader is the one making strategic decisions by considering the organization, its environment, and the technological system at place. Not only this, but the digital leader responsible to leverage digital energies but to combine it with creativity, communication, and courage. Digital leadership is comprised of two dimensions which include awareness regarding digital transformation and the attitude and competence towards the use of technology (Dewi & Sjabadhyni, 2021).

In past studies digital leadership has been associated with various other variables. These variables consists of psychological wellbeing of employees with the digital leadership skills and abilities of their managers (Dewi & Sjabadhyni, 2021). Moreover, researchers have studied the impact of digital leadership capabilities of managers on the digital culture of an organization and the digital capabilities of employees working there (Shin et al., 2023). Whereas there are numerous recent and previous studies that have studied the impact of digital leadership on innovation in the workplace or the innovative behaviour of employees (Erhan et al., 2022; Gilli et al., 2023; Winanti, 2021). Additionally, digital leadership has been linked with various employee outcomes in an organizational context. This involves a positive relationship with employee performance, motivation, employee creativity and citizenship behaviour (Eberl & Drews, 2021; Lubis et al., 2020).

Some of the skills that are associated with digital leaders are being communicative, digitally savvy, motivating, innovative, adaptable, and creative (Zeike et al., 2019). Whereas it is also known that there are certain characteristics of the digital leaders that differentiate them from other traditional leaders. These include creativity and innovation, with the use of digital technologies, digital leaders can provide complex business models and transform the dynamics of the business. Secondly the characteristic known is inquisitiveness, a leader who has the capability to deal with environmental characteristics like VUCA (volatile, uncertain, complex and ambiguous). Thirdly digital leaders are profound in a way that they understand the complex issues policies and the demands of the digital world. They are aware of the happenings in the environment and use their knowledge along with it. Lastly, a digital leader is visionary and provides direction. This direction is not only for goal achievement but to transform the business overall in the era of digitalization (Wasono & Furinto, 2018).

2.2.7 Innovative work behavior

The term of innovative work behaviour was first introduced by Scott & Bruce in (1994). According to them innovative work behaviour comprises of three different elements idea generation, idea realization and idea promotion. In accordance with this research, innovative work behaviour has been defined in prior literature as "Individuals' behaviours directed toward the initiation and intentional introduction of new and useful ideas, processes, products, or procedure within a work role, group or organization" (De-Jong, 2007, p. 19). As per researchers it has been established that the innovative work behaviour of individuals usually results from

the individuals own personal effort. This is important for our research as it has been an established proposition of the fact that the individual employees have to be digitalized and more engaged first, to display innovative behaviour (Erhan et al., 2022).

Recent studies have linked leadership such as transformational leadership with innovative work behaviour of employees (Karimi et al., 2023). Not only this but innovative work behaviour is derived from various other characteristics that might be the work environment or the employee own personal characteristics. For the work characteristic, researchers have investigated the impact of knowledge sharing culture on innovation in employees and the psychological empowerment provided to employees (Putra, 2023). While the employee personal characteristics that might play a role in the innovative work behaviour is the employee commitment, their psychological capital and the citizenship behaviour exhibited by employee (AlEssa & Durugbo, 2022; Li & Zheng, 2014).

2.3 Theory

2.3.1 Job demands-resources (JD-R) theory

The theory which is linked to this research is job demands resources theory (JD-R). Job demands resources theory was first introduced by Demerouti et al., (2001). They explained the JD-R theory as "The JD-R model proposes that working conditions can be categorized into two broad categories, job demands and job resources, that are differentially related to specific outcomes" (Demerouti et al., 2001, p. 499). There are two components of this job demands resources model; job demands and job resources. "Job demands refer to those physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological effort or skills and are therefore associated with certain physiological and/or psychological costs" (Bakker & Demerouti, 2007, p. 312). The job demands can include different factors like working overtime, high workload, more work pressure. These job demands result in mental and physical constraints to employees (Angerer & Müller, 2015). Whereas job resources are "Job resources refer to those physical, psychological, social, or organizational aspects of the job that are functional in achieving work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning, and development" (Bakker & Demerouti, 2017, p. 274). These job resources can include anything that contributes for the wellbeing of employee. This can range from

autonomy, feedback, growth and learning opportunity, skill variety and much more (Bakker, 2011; Bakker & de Vries, 2021).

Bakker et al., (2014) proposed the burnout and engagement model in relationship to the job demands resources theory to better explain the phenomenon. The concept of burnout was first introduced by Freudenberger, (1974) as "The gradual emotional depletion and loss of motivation among people" (Bakker et al., 2014, p. 390). Whereas engagement was first proposed by Kahn, (1990) where he described engagement as "Harnessing of organization members' selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances" (Kahn, 1990, p. 694). Bakker in his study has related the concept of burnout and engagement in the job demands resources model. The job demands have been determined as the cause of burnout. Whereas engagement at work is identified as the driver of well-being at workplace. In the beginning Bakker et al., (2014) proposed that there are two building blocks of JD-R theory. Firstly, it is a "two-step process". One process is the health impairment process whereas the other process is motivational process. While job resources predict the occurrence of enjoyment, motivation and productivity, job resources are the predictors of exhaustion, strain, burnout and health issues. Secondly the building block is flexibility in the model. This states that the model of job demands resources theory can be applied to different job occasions and different job characteristics as well. This can include different categories of jobs in any relative industry.

However, the two building blocks exceeded further to several propositions regarding the model based on which this theory is further explained. Firstly, it is proposed that the job demands, and job resources are the categories of job characteristics. Secondly, it is proposed that job demands and resources are two different phenomenon that activate two separate processes namely motivational and health impairment. Thirdly, both job demands and resources have an impact on well-being of employee, job demands weaken it, whereas job resources improve well-being. Fourthly, personal resources have a reciprocal impact on the job resources. Fifthly, it states that these personal resources mediate the relationship between job demands and wellbeing in a way that the personal resources allow them to cope with the demands and utilize the resources in a better way. The sixth proposition is that employees use job crafting to make the best use of resources and minimize negative effects by demands (Bakker et al., 2014, 2023). Job crafting is known as "Employees' personal initiative to change their job demands and job resources in order to better align the design of the job with their own abilities and preferences"

(p. 33). The seventh proposition is that the work engagement helps in activating the positive work behaviour of employees. Eighth proposition states that the job demands lead to strain as a result of which the employee leads to self-undermining behaviour. Lastly, the current job strain can lead to future job strains and work-related mistakes. The model that is proposed by Bakker is not simple but rather involves several interactions between job demands and resources.

The JD-R model is effective in terms of explaining the relationship between various job resources and job demands with employee burnout and wellbeing. Thus, drawing on the conceptualization of JD-R theory it is proposed that certain HRM practices and factors contribute to the job resources provided by organization (Bakker et al., 2023; Janssen, 2000). These include digital training, digital communication, digital task variety and digital job autonomy i.e., the digital job resources. Digital training is an effort from the organization to help improve digital skills of their employees and to enable them to better perform their digital job tasks and duties. Thus, digital training is one of the job resources provided by organizations (Popkova & Zmiyak, 2019). Secondly, the proposed job resource in our study is digital communication. Digital communication is the interconnected network provided by organization in order for employees to connect with each other and collaborate with other team members. It is considered as another resource for the employees to improve their engagement in a way that it helps build network and reduce any work anxieties. Thirdly the resource we have is digital task variety which is the variety of tasks that are provided to employees to perform on digital platforms. This will help in building engagement of employees as the more tasks, the more employees will have the opportunity to interact and work with the digital systems (Avgerinos & Gokpinar, 2018). Thus, more digitally engaged the employees will be. In addition to this, the fourth job resource that we proposed in this study is the digital job autonomy. Digital job autonomy refers to the freedom to employees to work on digital platforms themselves to make their own decisions with reference to digital work. This is a proposed resource as digital job autonomy is linked with the trust the supervisor has in the employee and his/her capabilities (Gerten et al., 2019).

Furthermore, in accordance with job demands resources theory, work engagement in the model is related with digital engagement in this study. Digital engagement is derived from those digital job resources that are explained before. This digital engagement refers to the enablement of the employees to use the digital technologies at work and the amount of energies that they

expend on the platform. Thus, this digital engagement allows the employees to feel positive regarding their work. Moreover, the digital engagement leads to positive work outcomes from employees (Drummond et al., 2020). These outcomes are digital leadership within employees and their innovative work behaviour. Digital leadership is the capability of employees to act as digital leaders in the workplace by promoting innovative ideas and exploiting the company digital platforms to achieve a competitive advantage. These practices have a proposed direct relation with the digital engagement. This engagement of employees will result in positive outcomes like digital leadership. Ultimately the employees as digital leaders will demonstrate innovative work behaviour to achieve their desired vision (Borah et al., 2022; Erhan et al., 2022).

2.4 Hypothesis development

2.4.1 Digital training and digital engagement

As explained earlier digital training means the effort that organizations make to upskill their employees in the context of digitalization and the use of digital platforms. Studies have revealed a direct positive relationship between training and engagement (Ngugi et al., 2023; Sani et al., 2022; Sendawula et al., 2018). As training develops the skill in the employees and enhances their capacity to perform better. This study will add the aspect of digitalization along with this to make sure that training is made to enhance digital skills and capabilities. Hence it can be proposed that when the employers work for the digital capabilities of employees and their digital skills, employee will be more involved and engaged with the technology at work and digital platforms. This involvement of employees will be referred as digital engagement. So, after digital training the employee will have a better understanding regarding the system and will exert extra effort to learn more regarding the technology.

Taking from the perspective of JD-R theory we are assuming the digital training as one of the digital job resource and digital engagement a positive result of resource. Hence, the employee who perceive this digital training as a resource and realising that they are being invested in, they tend to be more digitally engaged. Which involves being involved cognitively, emotionally and physically with their work and organization (Demirkan et al., 2021).

H1: Digital training has a positive impact on digital engagement.

2.4.2 Digital communication and digital engagement

Digital communication is another resource that is considered in this research. The main aim of this digital resource is to enhance the capability of employee to collaborate with others (Moreira-Fontán et al., 2019). Moreover, it is taken as a platform that enables the employee to be more involved with other fellow colleagues. It has been reported that although digital communication contributes very little towards the wellbeing of employee, it does maintain the minimal interactions of employees resulting in better engagement (Oberländer & Bipp, 2022). This minimal interaction is the part where employees feel connected to their organization and other fellow employees and decide to exert some effort either physically emotionally or cognitively (Liu et al., 2019). Thus, in the times when face to face interactions are not possible, digital communication would play a part for employees to keep them digitally engaged (Nguyen et al., 2022).

Considering the JD-R theory, the digital job resource in the form of digital communication helps employee to maintain interconnectedness. The employee will have the platform necessary to interact with others and clear their issues with others. Moreover, this platform will allow employee for a seamless connection with other without any hindrances and formalities (Galanti et al., 2023). For instance, most employees feel anxious while using emails to communicate. Hence a better facility in the form of digital communication is taken as a resource. As a result, employee gets more digitally involved with work due to better facilities available at workplace.

H2: Digital Communication has a positive impact on digital engagement.

2.4.3 Digital task variety and digital engagement

Digital task variety is referred to the different type of tasks that are available to employees. These different tasks can include tasks relating to different department, different skills, and different level. It is proposed that there is a strong link between digital task variety with digital engagement. Firstly, digital task variety is taken as a job resource that employees can utilize to become more engaged at work. It has been proven via research that offering task variety to employees helps to improve their work behaviour and enhance their work motivation (Abós et al., 2021). Moreover, it improves the productivity of employee as well as it allows critical thinking and multiple ways for task completion (Avgerinos & Gokpinar, 2018). Thus, this

study will be incorporating the use of different digital tasks by an individual to be involved digitally. This involvement in greater number and variety of tasks maintains the interest of employee and doesn't get them bored with monotonous task. As a result they feel more engaged in the work itself by making use of their best physical, cognitive and emotional energies (Agarwal & Gupta, 2018).

Taken from the viewpoint of job demands resources theory it can be proposed that digital task variety is the digital job resource provided to employee in the form of new opportunity at work. It is considered as an opportunity for skill development and learning new dimensions of business by multitasking. With the availability of this resource employees feel empowered and responsible. With the responsibility comes the obligation from the employees to be more digitally engaged with all the digital task and duties thus resulting in more digital engagement.

H3: Digital task variety has a positive impact on digital engagement.

2.4.4 Digital job autonomy and digital engagement

In this research we have employed digital job autonomy which accounts for the freedom and empowerment that employees have to take decisions regarding digital work tasks their scheduling and work alignment themselves. According to past research, autonomy is a factor for the employees to boost their self-determination. With their increase in self-determination and their self-worth, employees can value their own contributions in the organization (Dorssen-Boog et al., 2020). Along with this contribution, employees will feel responsibility and importance for their work. When employees make their own decision and have their own interests of carrying out the work, they try to do the best of them and put in their extra effort. Thus, it is proposed that digital job autonomy would act as a positive resource towards digital engagement, as they will be much involved with the work and technology, when they will be responsible themselves (Bureau et al., 2022).

In addition to this according to JD-R theory, if employee are provided with resources at work they are more engaged. Considering digital job autonomy as a digital job resource to employee as they will be provided with the necessary empowerment and trusting the employee with their decisions at work. This will be considered as a resource at work as employee will feel a sense of achievement. However, with the somewhat added responsibility employee will be obliged

to engage themselves more digitally in order to better understand the processes. This engagement might be as a result of the expectation that supervisors might have after giving autonomy to employee over digital work.

H4: Digital job autonomy has a positive impact on digital engagement.

2.4.5 Digital engagement and digital leadership

The more engagement with the technology, employees spend more time dealing with the issues and complications of such technologies and make efforts to resolve these. In addition to this it is often said that with more use of digital tools, one learns more regarding the processes and operating systems. This is how a person tries new techniques and ways of accomplishing tasks. When employee will start to interact with technology at a greater pace they can create and discover new ways of competing tasks in more effective and efficient manner. If employees involve more with the digital system, they develop more technical prowess. Hence, with the greater interactions it enables the employee to critically examine the merits and demerits of the system at place in the organization. Following from that the employee may begin to derive advantage and greater revenue with time by using the digital resources at work. This quality of driving the competitive advantage via the use of digitalized tools at work is digital leadership (Sawy et al., 2020). Additionally with the technical prowess comes the ability to think about improvements that might make the system more effective. This envisioning of digital transformation is one of the capabilities of digital leader. Thus, it is proposed that digital engagement has positive impact on digital leadership of employees (Men et al., 2018).

In relation to the JD-R model, it can be stated that the employee engagement leads to positive employee results in the form of performance. In this context employee being digitally engaged from the digital job resources are followed by digital leadership. The digital leadership capability is the positive result obtained from being digitally engaged with work.

H5: Digital engagement is positively related to digital leadership.

2.4.6 Digital leadership and innovative work behaviour

Digital leadership as a positive outcome from digital engagement would result in future envisioning by the employee. The future vision can involve installation of better digital system

at workplace or improvements in the previous one for work efficiency. However, a digital leader will not only envision but with the technical prowess the leader will be triggered to think of creative and new ideas and techniques. The more employees use digital resource of a company to derive competitive advantage and reap its benefits, it ultimately improves their ability to create something new and innovative (Mihardjo et al., 2019). Hence, this research will be exploring the employee behaviour that is positively impacted by digital leadership (i.e., innovative behaviour).

Drawing from JD-R theory we can explain that with the positive employee outcome of digital leadership results in innovative work behaviour. Employee after feeling invested by organization exhibits extra-role behaviour. This extra role behaviour is the innovative work behaviour. As in most of the cases job descriptions do not have the obligation of innovation, therefore this would be employee self-effort to provide back to organization in the form of creative ideas.

H6: Digital leadership is positively related to innovative work behaviour of employees.

2.4.7 Serial mediation of digital engagement and digital leadership

For the digital high-performance practices and digital resources available at work, which include digital training, digital communication, digital task variety and digital job autonomy. It has been proposed that digital engagement and digital leadership will mediate the relationship between these practices as job resources and innovative work behaviour, as a positive outcome (Magesa & Jonathan, 2022). These practices have been mentioned to be the job resources that employees can utilize to become digitally engaged. In reference to JD-R theory it can be inferred how the availability of these job resources can result in positive employee outcomes. With digital training employees feel invested and upskill themselves, with digital job autonomy employees feel empowered, with digital task variety employee get the opportunity to learn whereas with digital communication employee receive better interconnectivity with other colleagues or a better social support. Employee receiving these resources, get more involved physically, cognitively, and emotionally with their work. When employees are more digitally involved with the work and the digital resources, they utilize the resources in a way to drive revenue from them i.e., digital leadership. With the mindset of driving profit from the digital resources (digital leadership capability) they will be able to create

new ideas, processes and practices that will be innovative contribution towards the organization (i.e., innovative work behaviours) (Erhan et al., 2022). Thus, this study will be using innovative work behaviours as a positive outcome as it derives good revenue, idea and knowledge creation, and effective utilization of company's resources (Mihardjo et al., 2019).

Hypothesis 7a: Digital training has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

Hypothesis 7b: Digital communication has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

Hypothesis 7c: Digital task variety has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

Hypothesis 7d: Digital job autonomy has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

2.5 Conceptual framework

The framework depicts the serial mediation effect of digital engagement and digital leadership between the relationship of digital job resources with innovative work behaviour.
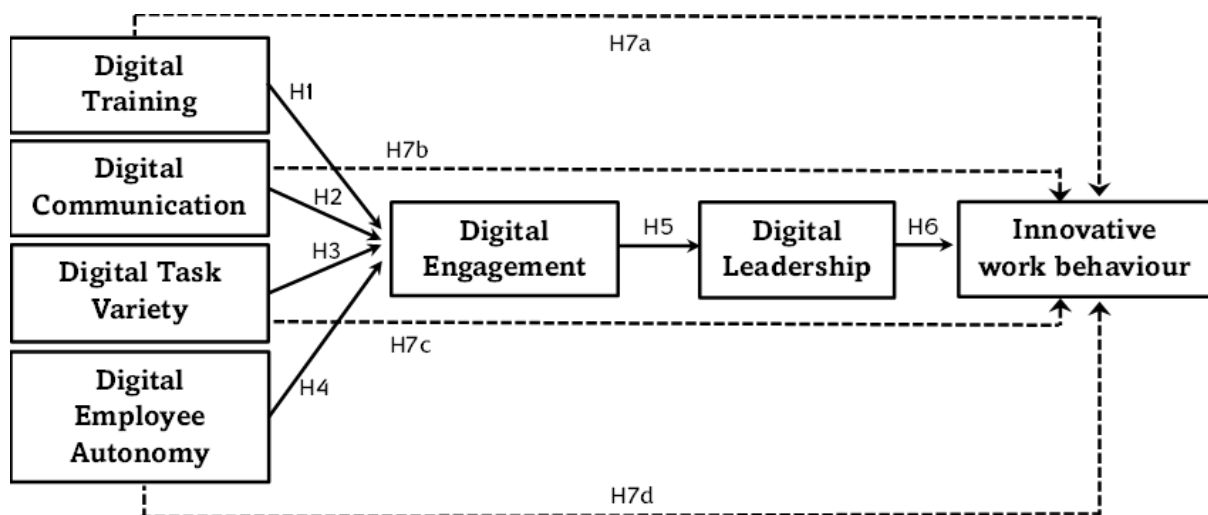
Figure 1: Conceptual framework

2.6 Chapter summary

This chapter elaborates the conceptualization of variables as is interpreted for this research. Furthermore, it begins by describing in detail all the variables used in the study. Followed by this it linked the theory of job demands resources model with our research and described how it explains the purpose of our study. Moreover, it is then followed by hypothesis development by linking different variables and explaining them through literature. Lastly a conceptual framework is illustrated with the help of arrows to show the hypothesis.

CHAPTER 3

METHODOLOGY

3.1 Chapter introduction

The chapter of methodology will explain in detail the research design adopted and the research methodology that will be the focus in this study. In addition to this this chapter highlights the target population, sample size, sampling techniques and the questionnaire administration procedure followed during data collection. After these methods, the measures for variables adopted from previous literature are then stated in this chapter.

3.2 Research design

A research design refers to the "plan or proposal on the basis of which the researcher conducts the research" (Creswell, 2015, p. 5). It involves three parts namely research philosophy, research methods and the strategies of inquiry.

3.2.1 Research philosophy

Research philosophy is known as "a system of beliefs and assumptions about the development of knowledge" (Saunders et al., 2019, p. 124). Research philosophies lay the grounding for the study to be conducted with one point of reference. Some major types of research philosophies include positivism, critical realism, interpretivism, post-modernism and pragmatism. A clear philosophy results in greater research validity and credibility. To differentiate between different research philosophies, it is important to consider the research assumptions based on which these philosophies are made. It also called worldview or research paradigms. Research paradigm means the "beliefs that guide actions" (Creswell, 2015, p. 6). There are three types of research assumptions. These include ontological, epistemological, and axiological assumptions.

Ontology refers to "assumptions about the nature of reality" (Saunders et al., 2019, p. 127). Ontology provides us an abstract view regarding the external occurrences in our surrounding. These assumptions can either be that the reality is objective, subjective or it depends on humans how to mould the reality through their actions (Bell et al., 2022). Epistemology concerns

"assumptions about knowledge, what constitutes acceptable, valid and legitimate knowledge, and how we can communicate knowledge to others" (Saunders et al., 2019, p. 127). Since ontology is based on abstract concept of reality, epistemology is the logical explanation of reality and it tells us "how to conduct research" (Bell et al., 2022, p. 30). Thirdly "Axiology refers to the role of values and ethics within the research process"(Saunders et al., 2019, p. 128). Axiology is based on the values on the basis of which the entire research is being conducted. It gives the study a credibility as it deals with ethics in research as well (Saunders et al., 2019).

The philosophy on which this research is being conducted is positivism. Positivism is the basis of our study as it assumes reality as "single, tangible and fragmentable" (Moroi, 2020, p. 128). Researchers have also explained positivism as "The view that considers the world is capable of objective interpretation and that social science should follow the methodologies and methods established in natural science" (Hammond & Wellington, 2013, p. 120). Positivists rests on the belief that if data is tangible and measured mathematically it is only applicable then (Kenaphoom, 2022). It has its grounds on the objective rather than subjective reasoning and assumes that there is one truth only (Yilmaz, 2013). Let us take into consideration the ontological assumptions (nature of reality) about positivist philosophy, it states that reality is really true, and independent. Whereas the epistemological assumptions (acceptable knowledge) state in terms of positivism that reality is measurable and observable, and there is causal explanation that can be provided for everything. Thirdly the axiology (role of values) claims that researcher maintains an objective stance and is neutral to the research (Saunders, 2012). Thus, positivism is the basis of our research. Hence, our research findings will contribute to the organizational context after the objective analysis of data collected, which could be applied directly to the corporate scenario (Saunders et al., 2019).,

3.2.2 Quantitative research

Quantitative research is known as the "A means for testing objective theories by examining the relationship among variables" (Creswell, 2015, p. 4). Quantitative research method is one type of strategy of inquiry. A strategy of inquiry is the "Method or model that provide specific direction for the procedures in research design" (Creswell, 2015, p. 11). There are three types of strategies of inquiry pointed out by researchers: qualitative method, quantitative method, and mixed method. The type of strategy of inquiry we have used in this research is quantitative

research. Quantitative research method can also be defined as "The research method in which statistics are generated through the use of large-scale survey research, using methods such as questionnaires or structured interviews" (Kumar et al., 2013, p. 72).

Quantitative research is valuable due to the several reasons. Firstly, quantitative research allows the researchers to conduct the study on a small sample or utilize smaller groups of people and as a result making inferences for larger community. In other words the study on a small sample of people can be generalizable to the entire population (in most cases) (Bartlett et al., 2001; Swanson & Holton, 2005). Secondly, the results are quantifiable in quantitative research and there are chances of minimum bias as compared to other methods. Since the results are in the form of numbers (i.e. objective) the chances of disagreement are modest (Mohajan, 2020). Thirdly, quantitative researches are effective and efficient in a way that after the data is collected it can quickly be analysed in software for quick results (Queirós et al., 2017).

Many scholars make use of quantitative research to derive direct conclusions regarding the study that can be practically applicable in organizations. Prior and recent studies have made use of quantitative research frequently due to the efficiency and reliability (Rahman, 2016; Rahman et al., 2022). Many recent studies based on digital leadership have opted for quantitative research as well (Jameson et al., 2022; Tigre et al., 2023). Quantitative researches increased in this field after a reliable scale has been developed by scholars for digital leadership (Arham et al., 2022).

3.2.3 Survey research

"A survey research is a research that provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population" (Creswell, 2015, p. 12). Survey research is a suggested by researchers as the issues of ethics can be easily catered while collecting data through a survey. Moreover, the confidentiality and anonymity of the participants can be easily maintained (Stockemer, 2019). There are different types of survey research. However the most common of these are the questionnaire method that we have employed (Saunders et al., 2019).

Recent studies in digital leadership have also adopted survey research method due to ease of data collection and to develop better interrelationship among different variables (Arham et al.,

2022; Benitez et al., 2022; Chatterjee et al., 2023). This study used survey research as it was a fit with the topic that we selected. Survey research is used to test causal relationship between constructs and this research aimed at investigating direct and indirect relationship between variables. Moreover, it allows the research participants to be satisfied with sharing their personal information. In addition to this survey research helps us conduct the study on a sample and generalize the results on a larger population having the same characteristics (Alreck, 2003; Blair & Conrad, 2011).

3.3 Population and sampling

3.3.1 Target population

Target population is known as "Complete set of cases or group members that is the actual focus of the research inquiry, and from which a sample may be draw" (Saunders et al., 2015, p. 729). Whereas there is difference between population and target population in that population is the group of people on which the research applied whereas target population is more specific (Fraenkel et al., 2011). It is important that a sample is defined before conducting he research as it helps the researchers be to the point and it helps them with conducting a feasible study. Our target population is technological professionals. Technological professionals refer to any professional working full-time in a corporate sector, whereas a majority part of the professionals' job is managed through use of technology. These professionals are also known as tech-geeks (Fairlie, 2022).

Since the world is rapidly moving towards artificial intelligence, digitalization, autonomation, algorithms and software processing, the requirement of technological professionals has increased by 57% in 2021 and is expected to rise upto 13% by 2030 (Ascott, 2022; Manyika et al., 2017). A report stated that technological professionals guarantee efficiency in any organizational operation followed by increased productivity and greater convenience (Manyika, 2017). This is the reason we have chosen technological professionals as our study context, since these employees have high interaction with the digital systems and greater engagement with digital platforms (Khorakian & Jahangir, 2018). Simply, entire work of these professionals relies on the technological platform and digital resources available (Amabile & Khaire, 2008; Khorakian & Jahangir, 2018).

Another reason for choosing technological professionals is their high interaction with the digital systems and being more engaged with digital tasks. Simply, entire work of these professionals relies on the technological platform and digital resources available (Amabile & Khaire, 2008; Khorakian & Jahangir, 2018). When it comes to innovative behaviour, technological professionals can be related more as the level of innovation can be easily measured due to nature of their outcomes. Additionally, their idea creation, new processes and procedures are more easily measured (Lukes & Stephan, 2017). These professionals are expected to create value by changing and innovating the processes and practices (Nash-squared, 2022). These technological professionals are often expected to act as digital leaders to transform the workplace through their innovative behaviour (Schepers et al., 2022). Thus, researching whether these tech-professionals will be the digital leader for tomorrow is the main aim of this study. Other characteristics of our target population include having a full-time job at any organization in Pakistan. In addition to this, our target population is not restricted to any age unless other criteria is being fulfilled. However, interns and other part time employees are not part of our target population.

3.3.2 Unit of analysis

A unit of analysis is defined as "The subject that is being studied in the research" (Kumar et al., 2013, p. 61). A unit of analysis is usually determined with the help of the research questions that we are focusing to answer. It can range from an individual, a dyad to a group/team of people (Saunders et al., 2019). It refers to the "whom" are you collecting data from (Creswell, 2015).

Since this study is targeting specific individuals separately regarding their workplace resources and the result of those resources. Therefore, the unit of analysis of this research are individuals. With reference to the certain characteristics of our unit of analysis, we are focusing on the individuals who are involved with technology daily for their work tasks. These individuals are technological professionals from Pakistan.

3.3.3 Sampling technique

The sampling technique that is used in this research for data collection is nonprobability sampling. It is the sampling method that use subjective judgement and uses convenient selection technique (Saunders et al., 2019). Other researchers have explained non probability

sampling technique as "The type of sampling technique in which the extent of bias in selecting the sample is not known, which makes it difficult to quote about the representativeness or the accuracy of sample" (Kumar et al., 2013, p. 127). There are different types of non-probability sampling techniques. These include convenience sampling, quota sampling, purposive sampling, and snowball sampling technique.

This research has gone through two phases of data collection. For the first phase we adopted purposive sampling while for the second phase we applied snowball sampling technique for data collection. Prior researchers have mentioned that with studies that involve survey method, non-probability sampling is the convenient and effective technique to use. Hence we used non-probability sampling (purposive and snowball sampling) in combination with survey method research (Rahman et al., 2022; Wiśniowski et al., 2020).

Additionally, the present study also employed purposive sampling technique. Purposive sampling is defined as "The type of non-probability sampling in which the choice of subjects are the ones who are most advantageously selected to provide the information required" (Kumar et al., 2013, p. 128). Purposive sampling is also known as subjective, judgemental, or selective sampling method (Sharma, 2017). Whereas a purposive sample is known as "The sample whose characteristics are defined for a purpose that is relevant to the study" (Andrade, 2021, p. 87). Purposive sampling is usually used in studies that require information which is pertinent and valuable. Therefore, in a purposive sample the respondents are the ones that provide the most accurate information regarding the topic.

Many other researches have utilized purposive sampling for all types of research including qualitative and quantitative studies (Purwanto et al., 2021; Thottoli & Ahmed, 2019). In addition to this many other recent studies based on digital leadership and innovation have also applied purposive sampling for data collection to specify their sample and respondents (Hutajulu et al., 2021; Lubis et al., 2020; Winanti, 2021). With the use of purposive sampling, analysis can be more precise, and results can be applied directly to the sample population (Campbell et al., 2020). Therefore, our study used purposive sampling to specify our respondents to technological professionals at first. Since, starting the research it was believed that technological professionals were the ones spending maximum time on technology with respect to other professionals.

The second phase of data collection was executed online where the questionnaire was administered through google forms via LinkedIn. The sampling technique opted for second phase was snowball sampling. Snowball sampling is defined as a "method that yields a study sample through referrals made among people who share or know of others who possess some characteristics that are of research interest" (Biernacki & Waldorf, 1981, p. 141). It is also known as chain referral sampling (Biernacki & Waldorf, 1981). Some researchers have mentioned snowball sampling technique as the "Sampling technique where the samples are collected by reference" (Kumar et al., 2013, p. 129). Snowball technique is a type of volunteer sampling method.

Scholars have used snowball sampling technique for a better sample size in recent researchers that involve digital leadership (Abidin, 2023; Baglama et al., 2022; Büyükbeşe et al., 2022), and innovative work behavior (Alaghbari, 2022; Karani & Mehta, 2021; Lawande, 2023). Snowball sampling method is effective for data collection as firstly it results in large amount of quality data in less amount of time. Secondly, the concerns of data validity are dealt since the sampling technique itself says volunteer sampling i.e. where the respondents are themselves willing to fill the survey. Hence, it can be claimed that the data can be of somewhat better quality in this case as compared to other sampling techniques (Saunders et al., 2019). Thirdly, the ethical concerns are taken care of, with reference to the emphasis on "voluntary participation" (Marcus et al., 2017). Even the respondent anonymity and confidentiality is better managed in the snowball sampling technique as there is no direct contact of the researcher with all the research participants (Waters, 2015). We have used this technique of non-probability sampling to reach out to the *hidden* participants on which the study might be applicable. Moreover, since it was quite challenging collect data from females, this is why we opted for snowball method to better increase our reach to prospective respondents (Parker et al., 2020).

3.3.4 Sample size

Sample size is the number of participants and respondents that are the focus of a study and based on which the results are generalized on the population. In other words, sample size is a smaller representation for the population (Schönbrodt & Perugini, 2013). It is of great significance as the researchers conduct the study on a smaller number of people among the

entire population and generalize the findings on the population. Hence, it is crucial to determine an accurate sample size for the study (Taherdoost, 2017).

We performed the G*power analysis for this study. Results of the power analysis show that a minimum sample size of 85 was necessary to achieve 80% statistical power for a medium effect (0.15) and a significance level of 0.05 (5%). Thus, accordingly it provides us with the minimum sample size that this research should have targeted (n=85) (Hair et al., 2010). However, the model that is being used is complex and involves structural equation modelling for the data analysis. Therefore, in accordance with the G*power analysis and other criteria mentioned above we focused on a minimum sample size of 200 samples and achieved a sample size of 307 respondents. Moreover, in reference to our method of data analysis it is proposed that a minimum sample size of 200 must be used for effective correlation analysis and validity of results from Smart PLS (Kline, 2016; Memon et al., 2020). Therefore, 200 was taken as a minimum criterion for our data collection.

Another rule of thumb in this method states that it must meet a ratio of 5:1. This means that with one item there should be at least 5 samples. Previous scholars Gorsuch (1983) and Suhr (2006) have suggested and agreed with this rule of sample to item ratio. For this study we have around 32 items. Thus, in accordance with this 5:1 rule of thumb the minimum sample size that was calculated is around 160 respondents. Whereas the sample size we have obtained (n=307) is more than satisfactory.

3.4 Questionnaire design

3.4.1 Instrument

To develop a questionnaire, present study used previously formulated scales by scholars for each of our variable. This study used these scales as they are already tested, and their reliability and validity are good to conduct a study. All these scales were administered through a 5-point Likert scale with anchors ranging from (1-Strongly disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree).

Digital leadership

A 6-item scale for digital leadership developed by Zeike et al., (2019) was adopted. Digital leadership is defined as "The ability of individuals to lead others, teams, or entire organisations to give full play to digital thinking by leveraging digital insight, digital decision-making, digital implementation and digital guidance to ensure that their goals are achieved" (Peng, 2021, p. 7). One of the sample items includes "I think using digital tools is fun". Reliability of this scale is reported to be 0.87 (Zeike et al., 2019).

Innovative work behaviour

A 4-item scale for innovative work behaviour of employees is used which is derived from the scale developed by Bysted (2013), Scott & Bruce (1994) and Janssen (2000). This 4-item scale has been derived by Nguyen et al., (2019). Innovative work behaviour is defined as "Individuals' behaviours directed toward the initiation and intentional introduction of new and useful ideas, processes, products, or procedure within a work role, group or organization" (De-Jong, 2007, p. 19). Sample items include "I create new ideas for improvements during my work". The reliability for this scale has been reported to be 0.70.

Digital engagement

A 6-item digital engagement scale developed by Shuck et al., (2017) was adapted and added in the questionnaire. Digital engagement is defined as "Active, work-related positive psychological state operationalized by the intensity and direction of cognitive, emotional, and behavioural energy to use digital platforms and information communication technology" (Jesuthasan, 2017, p. 46). The component of "digital" was added with tasks and engagement to reflect the construct digital engagement. One of the sample items includes "While performing the digital job task I am really focused". Reliability value reported for this scale is 0.80 (Shuck et al., 2017).

Digital job autonomy

For digital job autonomy a 3-item scale initially developed by Voydanoff (2004) was adapted. Employee job autonomy is defined as "The degree to which the job gives the worker freedom, independence, .and discretion in scheduling work and determining how he will carry it out digitally" (Hackman et al., 1975, p. 59). The word digital was added in the original item to present the construct digital job autonomy more clearly. A sample item includes "In my digital

job task(s) I have the freedom to make decisions". Reliability Cronbach value is stated to be 0.68 for this scale.

Digital communication

For digital communication, a 4-item scale was adopted, which was initially developed by Na-Nan et al., (2019). The sample item includes "I greet and ask about friends and acquaintances with polite words". Whereas digital communication is defined as "The ability to communicate and collaborate with others using digital technologies and media via discussion" (Na-Nan et al., 2019, p. 1469). The reliability for this scale is stated to be 0.88 (Na-Nan et al., 2019).

Digital task variety

Furthermore for digital task variety a 4 item scale; developed by Morgeson & Humphrey (2006) is adapted. Digital task variety is defined as "A job characteristic that involves performing digitally diverse tasks by using different digital skills and digital talents and frequently" (Lan & Chen, 2020, p. 4). The changes made in the questionnaire were mainly to reflect digital task variety. The component of "digital" was added in questionnaire items. While the sample item includes "The job involves a great deal of task variety to be performed digitally". The reliability Cronbach's alpha value for this scale is reported to be 0.87 (Morgeson & Humphrey, 2006).

Digital training

A 5-item scale is adapted for digital training. It was initially developed by Schmidt, (2004) which was further reduced to a 5-item scale. The 5-item reduced version has been used by various studies (Hanaysha, 2016b, 2016a). Digital training is defined as "Efforts made by companies to improve employee digital skills, digital knowledge, digital competencies, and digital capabilities so as to achieve the organization's objectives and produce expected results" (Chikazhe & Nyakunuwa, 2022, p. 296). The changes made in the questionnaire were mainly adding digital component in the items. A sample item includes "My organization provides digital training opportunities". Reliability for this scale is reported to be around 0.83 (Schmidt, 2004).

3.5 Instrument validation

Validity is defined as "Whether an instrument actually measures what it sets out to measure" (Field, 2009, p. 11). Instrument validity is important as it determines whether the scale used in the survey for a designated variable measures exactly what is supposed to measure. A scale with good validity helps in building credibility of research (Taherdoost, 2016). The scales that have been used in this research are developed by previous well-known scholars and their reliability and validity are already measured. In addition to this, for rechecking the reliability and validity of the instrument we analysed the items of each variable in SmartPLS to check for the outer loadings value. Each of these values were above the threshold value of 0.70. Therefore, the validity of the instrument was assured through results as well (see Table 2). Furthermore, all the variable scales were sent to different scholars in the relative field. A copy of questionnaire was sent to experts for questionnaire validation. The suggested changes were made for better questionnaire administration (see pretesting).

3.6 Instrument language

The language in which the questionnaire was administered is English. English language is specifically used for different reasons. Firstly, English is still the co-official language of Pakistan as is mentioned in the constitution of Islamic republic of Pakistan (Ali, 2013). In addition to being the official language, it has been mentioned that in order to conduct business in Pakistan English language should be used (Haidar & Fang, 2019; Shamim, 2017).

The questionnaire was pretested and pilot-tested to ensure that there was no language issue. It was assured that the questionnaire was easily comprehendible by the participants and the sentences used in questionnaire were interpreted the same way. To ensure that there is no such issue regarding understanding the language of questionnaire suggestions and recommendations were taken from the respondents. In addition to this the study participants selected were the ones that had minimum qualification of bachelors and were working in well-known organizations in Pakistan. This made sure that there was no language barrier. As all these organizations had their official business language as English and the participants were either professional or fluent in English language (Wenz et al., 2021).

3.7 Pretesting

The questionnaire was pre-tested to make sure that it was completely understood by the participants. Pretesting is known as "The stage in survey research when survey questions and questionnaires are tested on members of target population/study population, to evaluate the reliability and validity of the survey instruments prior to their final distribution" (Hu, 2014, p. 5048). Pretesting is performed on a small number of people from the sample before administering the questionnaire. There are various ways to pre-test a questionnaire. These include behaviour coding, cognitive interviews, conventional pre-test and expert panels (Collins, 2003; Presser & Blair, 1994). Behaviour coding type of testing is based on interviewer-respondent interaction. It is based on the premise that whenever there is a flaw in the question, the interviewer will observe certain changes in the behaviour of the respondent. This helps in identifying where the flaw occurred. Since most of the respondents might hesitate to inform regarding misunderstand of a question. This procedure is mostly followed in qualitative method (Blair & Srinath, 2008). Whereas in probing the interviewer asks questions from the respondent regarding the questionnaire. Thirdly the method used is conventional pre-test in which trained interviewers conduct interviews of respondents and discuss their views with each other to draw conclusions (Howard, 2018). Lastly, we have expert panels, in this method researchers/scholars are asked to review the questionnaire. The expert may belong to the relative field of interest that the researcher is focusing on (Presser & Blair, 1994).

Pretesting is carried out for numerous reasons. Firstly, it helps with identifying any errors in the questionnaire regarding the language used, grammar issues or any sentence structure problems. Secondly, pretesting determines if the study participants perceive the same meaning of the sentences as is intended by the researcher and the scholars who developed the scale. Thirdly it is significant to improve the quality of data. A better quality of data means good results after the analysis. Fourthly, pretesting the survey helps to remove any doubts ambiguities of the participants regarding the questions and understand if they fully comprehend the questions easily on their own.

In this research we used the type of pretesting referred as expert panels and cognitive interviews. The respondents were asked to 'think-aloud' as they answers the question or completes the questionnaire" (Collins, 2003, p. 235). We performed a pre-test on 6 respondents. Three out of these 6 respondents were from reputable IT companies. Two of the

participants mentioned that they had issues with the length of the questionnaire as they lost track and interest to fill the questionnaire halfway through it. At the beginning we had 44 items (digital communication-4, digital task variety-6, digital training-5, digital job autonomy-9, digital engagement-6, digital leadership-6 and innovative work behaviour-10). Hence, after careful consideration and further research into shortened versions of scales, the questionnaire was reduced to around 32 items (digital communication-4, digital task variety-4, digital training-5, digital job autonomy-3, digital engagement-6, digital leadership-6 and innovative work behaviour-4).

For the other 2 respondents we targeted scholars and professors from reputable well-ranked universities for validating the questionnaire (expert panels). These scholars were experts in innovation and innovative work behaviour. Both recommended to make a few changes in the items of our variable "digital task variety". This study included three items for digital task variety adopted from Morgeson & Humphrey (2006). One of the sample items were "The job involves a great deal of task variety to be performed digitally" which was changed to "My job involves a great deal of task variety to be performed digitally" for better interpretation.

3.8 Pilot study

It has been stated as "A 'small study for helping to design a further confirmatory study" (Arain et al., 2010, p. 1). Pilot study is thus a study of a small number of sample population (Sorra et al., 2022). It is often known as a test run. It is significant to run a pilot study because of certain reasons. Firstly, a pilot study ensures whether the technique used for data collection and the sample chosen are valuable. Secondly, a pilot study helps to determine whether the instrument scale used in the study are reliable and valid. Thirdly a pilot study helps to assess the research method and design, whether the research is realistic to conduct. Apart from these a pilot study helps in many other ways like in the collection of preliminary data to assess feasibility of the project to be conducted on a full scale etc (Lowe, 2019; Memon et al., 2017).

A pilot study was carried out to make sure that the study will be viable to be conducted on a full scale. We conducted pilot study to be sure about the feasibility and reliability of our study if conducted on a full scale (Seth et al., 2022). The method we followed to calculate the sample to conduct the pilot study was of Connelly (2008). A total of 45 initial samples were used for

the pilot test. The results show a good reliability value (above 0.7) of instruments used, thus confirming the consistency of the scales.

3.9 Time horizon

The time horizon under which the study has been conducted is cross sectional design. Cross sectional study is "in which data is collected just once to enable the researcher to answer the research questions" (Kumar et al., 2013, p. 60). In this type of study all the variables of the research are measured altogether rather than collecting data on them separately. Researchers have mentioned that a cross sectional study design is most often applicable in the research that are exploratory and descriptive in nature. It is most often used where the researchers aim at determining a direct or indirect relationship between two or more variables (Levin, 2006). Many prior studies have focused on cross sectional research. Recent studies on digital leadership in educational institutions and manufacturing sector have also utilized cross sectional method to collect data for their research due to convenience and better results (Abidin, 2023; AlAjmi, 2022). Thus, the present study has employed a cross-sectional approach.

3.10 Questionnaire administration

3.10.1 First wave

For the first wave of data collection, we followed the purposive sampling technique. In this wave of data collection, we started through online mode via LinkedIn. In order to determine the right people for our data we used the search function in LinkedIn and followed to search for some technological professionals. We started with direct technological professionals as we were sure that these professionals do have involvement of technology on a daily basis for the purpose of fulfilment of their tasks. The professionals we searched for were software engineers, data scientists, developers, and data engineers etc. Only these targeted professionals were sent with the questionnaire.

In addition to the online method, we started to work on face-to-face method and requested approval from different company representatives. Firstly, we approached different HR personnels on LinkedIn associated with well-known IT/software companies in Pakistan. A list of top 10 IT companies was obtained from an electronic newspaper article and confirmed with other authentic websites (Saleem, 2023). After a week of sending messages to the employees

on LinkedIn, follow up messages were sent to those that didn't reply. Meanwhile we got approval for the face-to-face data collection in a software company, we went for it alongside continuing online method. The Islamabad head office was in Ufone tower where data collection begun. I approached different professionals that belonged to our target market. We asked them regarding their willingness to fill out the surveys and distributed them among the employees that were relevant to the study. We were able to collect data from 8 employees in the software house.

3.10.2 Second wave

In second wave the data collection was collected through snowball sampling method via both online and face to face methods. A rigorous data collection process was followed in the second wave of data collection. Firstly, employees on *LinkedIn* were contacted to fill out the surveys and they were requested to share it with their colleagues that might be relevant for the study. A follow up was done after a week and two weeks again. Moreover, the second method we used was via referrals. We contacted employee working in multinational well reputed firms and requested them to float the questionnaire among their employees that might be appropriate for the research and willing to fill out the survey.

Furthermore, in addition to connecting with referrals we collected data specifically targeting female employees. The ratio of male to female was not acceptable and we had to perform analysis separately for the male and female employees. Thus, to maintain the balance, we asked female employees for reference and to forward the questionnaire among other females working in corporate sector of Pakistan. Respondents were provided information regarding the research and its purpose to ensure informed consent and they had full authority to decide their willingness to participate in the research. Moreover, in both the phases of data collection participants anonymity and confidentiality was ensured such that there was no personal information required in the questionnaire not even the participant email address.

3.11 Response rate

A response rate is known as "The total number of responses divided by the total number in the sample after ineligible respondents have been excluded" (Field, 2009, p. 726). Some researchers suggest that response rate is the indicator of a survey quality (Lynn et al., 2001). A high response rate is of significance as it lowers the possibility of non-response bias for the

questionnaire. A non-response is known as the sample population that refuses to answer the survey (Stedman et al., 2019). Achieving a high response rate is usually difficult in survey research specially if it is administered online (Poynton et al., 2019; Toomey et al., 2019). A response rate is measured by dividing the total number of samples received with the total number of participants you have sent the survey to. This is done to know about the non-response of a questionnaire (Field, 2009).

We used two sampling techniques in our study. Due to this reason, we cannot determine the exact response rate for this study as the data is collected at different point in time and snowball sampling is used. Since snowball sampling is reference based sampling and it is impossible to keep track of each respondent. Hence, response rate cannot be calculated for this study (Marcus et al., 2017).

3.12 Initial screening

After receiving the data from face to face and google forms, it was screened for any issues in the data. For screening of the collected data, we used three steps. Firstly, we searched for acquiescence bias in our response results. Acquiescence bias is known as "A type of response bias which shows agreeing to items regardless of content" (Danner et al., 2015, p. 1). It is quite common in self-report surveys (Kuru & Pasek, 2016). Often when the respondents consider the questionnaire as quite lengthy, they respond with a same response throughout the questionnaire. This sort of issues are quite common in survey research (Dahlgaard et al., 2019). This shows that the respondent did not responsibly answer the survey. Although every researcher aims to collect quality data, but these error and bias might occur. It can be the result of lack of interest of participant, and they might not have read the sentences properly. Which is why these sorts of responses must be excluded to maintain data value (Hendra & Hill, 2019; Story & Tait, 2019). For instance, some participants might check number 5 (in a Likert scale of 1-5) throughout all the items of questionnaire.

Secondly, the issue that we analysed for our data was missing value analysis. Before analysing the data, it was made sure that there is no missing value in the survey. With presence of a missing value the data analysis can result in "distorted statistical power" (Acock, 2005, p. 1) and biased conclusions. A missing value is known as "A value for which there is no recorded value from a participant for a certain item/question" (Field, 2009, p. 77). There are two types

of missing values missing at random and missing at non-random (Mirzaei et al., 2022). A missing value analysis is usually performed for survey-based research prior to data analysis in SPSS to make sure that analysis will be performed without an error. SPSS finds the variable and the item in which missing values exist. In case of any presence, they are replaced by running a function from "transform" in the software (SPSS) known as "Replace missing values". The missing value analysis was also performed for our data after entering it in SPSS software. There were no missing values in our data detected hence there was no need for replacement.

Thirdly, we look for the responses that do not fall in our target sample. Since this research followed two type of sampling techniques (purposive and snowball sampling). Therefore, there were chances of data gathered from participants that are different from our criteria. The data that we aimed to collect was from full-time employees based in Pakistan. However, after receiving the collected data we received responses from participants from different categories. For the samples that did not fall into our target population were under three categories. Firstly, the respondents were excluded on the basis of geographical location. Some of the respondents were not located in the vicinity of Pakistan, these included participants from foreign countries. Secondly, the samples were excluded based on their job position. Some of the respondents were intern while some left the option as blank. Therefore, these were excluded from the total sample size. The total number of responses that we collected were 345, after removing the initial data from such respondents we were left with 307 total responses. Hence, our final sample size on which we performed our structural equation modelling was 307.

3.14 Ethical considerations

As a responsible researcher, while conducting the research, it followed ethical rules and guidelines. Some of these basic ethical considerations have been mentioned by Bryman & Bell (2011); Creswell (2015) and by Saunders et al., (2015) in their widely accepted research method books. Firstly, all the participants had a voluntary participation. Consent of each participant was obtained before data collection. Voluntary participation is the willingness of the human subject to be part of the research. Every participant had a free will in this case and was allowed to decide for no participation as all international laws protect this right (Lavrakas, 2008). In addition, participants who would did not want to part of the research at any point were allowed to withdraw their responses without any bound obligation.

Secondly, respondents were participating after having an informed consent. This consent is different from their willingness to participate. It involves the obligation of the researcher to provide sufficient information to the participants that are necessary for them. For instance, it could involve any post research or study implications that the participant should be aware of (Saunders, 2012). Therefore, it was ensured that there is an informed consent of the respondent. Thirdly, participant confidentiality and anonymity were kept in strict consideration. Confidentiality of the participant stands on that the information regarding the participant, including their personal identity or their responses was not disclosed to anyone outside the team of research (Creswell, 2015). This protects the participant against any sort of psychological, legal or social harm (Saunders, 2012). Anonymity of the respondents was also ensured in this case. It refers to not collecting any personal data if otherwise related to the research. It involves not including any codes to recognize the responses and identify them with the person and their identity, which can involve their occupation or organization (Saunders et al., 2015). Furthermore, the responses have been used for academic purposes only.

Fourthly, it was ensured that the language used in the questionnaires was ethically acceptable. Use of offensive words and discriminatory sentences was avoided. Moreover, the questionnaire was pretested to validate these concerns before administering the survey. It was confirmed that the language and words used are comprehendible and easy to understand. Sentence structure was clear and any sort of errors in the questionnaire were removed to avoid any misinterpretation (Hultgren et al., 2016). Finally, the results and analysis are presented with full honesty and responsibility, without any plagiarized material (Bhandari, 2021). It is assured that no sort of artificial data or figures are created or stated. The reports and results are accurate and are not influenced or favoured for any organization or personal entity (Creswell, 2015).

3.15 Chapter summary

The above chapter of methodology explained the methods adopted for this research starting from the research design, research philosophy, and the strategy of inquiry. Leading from that this chapter explains the questionnaire adoption and the questionnaire administration techniques along with the target population, sampling technique and the sample size. Lastly, it ends with the measures adopted for various variables and the ethical considerations that were kept in mind while data collection.

CHAPTER 04

DATA ANALYSIS AND RESULTS

4.1 Chapter introduction

This chapter will start with the description of the initial sample size, excluded samples and explaining the exclusion criteria. Further, it demonstrates the demographic information of the respondents that participated. Moving on, this chapter explains the methods used for quantitative analysis their benefit and displays the results obtained after analyzing the data. In addition to hypothesis testing this chapter has divided the analysis method into two parts: measurement model and structural model.

4.2 Demographic information

4.2.1 Age

The age of participants ranged from "Below 20 years" to "Above 50 years". Whereas most of the samples belong to the age category of 21-30. 0.3% of sample were below 20 (n=1). 84.0% of the sample were aged between 21-30 (n=258). 13.7% sample were from 31-40 (n=42). 1.6% of the sample were from 41-50 (n=5). While only 0.3% was from the age above 50 years (n=1).

4.2.2 Gender

A total sample of 307 full-time employees was collected. Out of this only n=95 (30.9%) were females whereas the rest of sample n=211 (68.7%) participants were males. Although with respect to population females constitute 49.5 % of the population of Pakistan. However, the number of females in corporate sector is still alarming. Recent report by world bank stated that females represent 22% of full-time employees in organizations of Pakistan (ILO, 2023). Thus, due to this disparity collecting 95 female data was quite challenging.

4.2.3 Qualification

Qualification level of the respondents were mainly bachelors or masters. Out of n=307, 62.5% were bachelors (n=192), 35.2% were masters (n=108), whereas 1.6% were having professional certification (n=5), and 0.7% were having other qualification (n=2).

Table 1: Demographic information of respondents (n=307)

Variable	Category	Frequency	Percentage
Gender	Male	211	68.7
	Female	5	30.9
	Other	1	.3
Age	Below 20	1	.3
	21-30	258	84.0
	31-40	42	13.7
	41-50	5	1.6
	Above 50	1	.3
Qualification	Intermediate	0	0
	Bachelors	192	62.5
	Masters	108	35.2
	PhD	0	0
	Professional Certification	5	1.6
	Other	2	.7

4.3 Multicollinearity

Multicollinearity refer to "a high correlation between two or more independent variables" (Wooldridge, 2012, p. 93). Multicollinearity is tested by analysing the variance inflation factor of the items used in the questionnaire. The VIF value is computed in such a way that a value greater than 10 shows the presence of multicollinearity. Another cut of value for this measure is 5.0 for computing VIF value (Burns & Burns, 2008). Multicollinearity occurs when there is strong correlation in the independent variables. The issues of multicollinearity results in numerical and statistical consequences. These consequences include difficulty to conduct regression analysis and issues in computer calculations (Lavery et al., 2019; Siegel & Wagner, 2022). It may also result in biased estimation and faulted interpretation of data. Hence it is necessary to analyse the data and check for the variance inflation factor (Gokmen et al., 2022).

Before analysis of the structural model, the VIF value was also calculated for this study to assess the issue of multicollinearity in the model. The result of our analysis showed that all the values were below the threshold value of 5.0 as suggested by (Hair et al., 2014). Thus, it indicated absence of multicollinearity in our study.

4.4 Common method bias

Common method bias (CMB) is known as "When the estimates of the relationships between two or more constructs are biased because they are measured with the same method" (Jordan & Troth, 2020, p. 5). In other words "It refers to the amount of spurious covariance shared among variables because of the common method used in collecting data" (Malhotra et al., 2006, p. 1865). It is one of the main concerns that needs to be addressed in survey research and is more common in self-report surveys (Tehseen et al., 2017). Common method bias can occur when the respondents perceive a similar meaning with respect to the variables. It is necessary to adopt methods to remedy any such concern during data collection, as common method bias can result in validity issues of the study (Kock et al., 2021). However, other researchers have stated that CMB is not much of a concern and it does not alter the credibility of a research since the researcher is not at fault in most cases (Spector, 1987).

We have used these procedural and statistical methods to ensure that there is no presence of common method bias in our study. We informed the respondents regarding the questionnaire keeping in view the ethical considerations. Secondly, we differentiated the items in the survey by use of different sections and we informed the participants that each section is independent of the other. In addition to the procedural methods, we followed the statistical techniques like Harman single factor test. Harman's Single Factor Analysis using exploratory factor analysis was performed to test the CMB. We analysed our 32 items in SPSS using principal component analysis adopting varimax rotation. There are several cut-off values suggested to measure common method bias in research. In management sciences when measuring behaviour of individuals it is suggested that the value must not exceed 40% (Malhotra et al., 2006). The value obtained for single factor variance was 26%. Our results suggested that common method variance was not a concern in this study as the value for covariance was below the cut-off value of 40%.

4.5 Structural equation modelling

The hypothesis of our research will be tested using SPSS and Smart PLS 3.0. Smart PLS is a "Comprehensive software program with an intuitive graphical user interface" (Sarstedt & Cheah, 2019, p. 1). We have used Smart PLS as it offers a wide range of structural modelling and algorithmic options with an advanced usability. The statistical technique that will be performed in Smart PLS to test our hypothesis will be partial least square structural equation

modelling (PLS-SEM). There are various other softwares used to conduct this test. However, Smart PLS is the most frequently and widely used software for conducting PLS-SEM (Hair et al., 2014).

PLS-SEM estimates "the parameters of a set of equations in a structural equation model by combining principal components analysis and regression-based path analysis" (Ringle et al., 2020, p. 2). PLS-SEM is used for various reasons. Firstly, it is a convenient method to use when predicting the dependant variable (Sarstedt & Cheah, 2019). Secondly, this method can analyse complex models as well. Thirdly, PLS-SEM can manage small sample size studies as well. Fourthly PLS-SEM is used to test incremental models that have mediation effect and this research involves a serially mediated model (Richter et al., 2016; Roldán & Sánchez-Franco, 2012). There are two steps that are to be performed while analysing the model using PLS-SEM. Firstly, the measurement model is tested that measures the internal consistency reliability, average variance extracted, discriminant validity and the convergent validity. Secondly the structural model is assessed that examines the models and tests the hypothesis (Anderson & Gerbing, 1988).

4.6 Measurement model assessment

4.6.1 Internal consistency reliability

"A measure of the degree to which the items reflect the latent constructs" (Richter, Sinkovics, et al., 2016). There are several measurements taken for internal consistency reliability these include Cronbach alpha, Kuder-Richardson formula etc. We will be measuring internal consistency reliability by the composite reliability (CR) value. The value of composite reliability must exceed the threshold value of 0.70. An ideal value for internal consistency reliability must be between 0.70 and 0.90. All of our values for variables were between 0.70-0.90; digital communication (0.87), digital engagement (0.89), digital job autonomy (0.87), digital leadership (0.89), digital training (0.88), digital task variety (0.84), innovative work behavior (0.87). The values are shown in the Table.

Table 2: Internal consistency reliability and convergent validity

Constructs	Items	Loadings	CR	AVE
Digital communication	DC01	0.798	0.870	0.630
	DC02	0.819		
	DC03	0.771		
	DC04	0.773		
Digital Engagement	DE1	0.771	0.890	0.570
	DE2	0.763		
	DE3	0.696		
	DE4	0.767		
	DE5	0.747		
	DE6	0.781		
Digital job autonomy	DJA01	0.740	0.870	0.690
	DJA02	0.879		
	DJA03	0.865		
Digital Leadership	DL1	0.792	0.890	0.590
	DL2	0.802		
	DL3	0.786		
	DL4	0.810		
	DL5	0.694		
	DL6	0.701		
Digital Training	DT01	0.688	0.880	0.590
	DT02	0.795		
	DT03	0.782		
	DT04	0.798		
	DT05	0.768		
Digital task variety	DTV1	0.706	0.840	0.560
	DTV2	0.661		
	DTV3	0.803		
	DTV4	0.818		
Innovative work behaviour	IWB1	0.742	0.870	0.630
	IWB2	0.786		
	IWB3	0.815		
	IWB4	0.821		

Notes: CR: composite reliability, AVE: Average variance extracted

4.6.2 Convergent validity

Convergent validity is "the extent to which a measure correlates positively with an alternative measure of the same construct" (Hair et al., 2014, p. 102). Convergent validity is measured by assessing the outer loadings value of the items of all the constructs used in the study. In addition to the outer loadings, it is assessed that the values for average variance extracted must be more than the threshold value of 0.50. A rule of thumb for the factor loadings is that they must be more than 0.708. However, items that might have values close to 0.60 are also acceptable keeping in view that AVE value for the same construct does not reduce below 0.50. Pertaining to the above-mentioned rule, some of the factor loadings of items related to some constructs were below the ideal value of 0.708. Nevertheless, the AVE value did not reduce below 0.50 (Digital communication, 0.63; digital engagement, 0.57; digital job autonomy, 0.69; digital leadership, 0.59, digital training, 0.59; digital task variety, 0.56; innovative work behaviour, 0.63). All these values are displayed in the Table.

4.6.3 Discriminant validity

Discriminant validity is "the extent to which a construct is truly distinct from other constructs by empirical standards" (Hair et al., 2014, p. 104). We examined the DV with Fornell and Larcker criterion. This criterion is used to compare the correlation of the constructs with the AVE value of the constructs. The rule of thumb for Fornell & Larcker (1981) is that the square root of the AVE of one construct must be greater than the correlation value for that construct. The table below shows an adequate value for DV obtained.

Table 3: Discriminant validity

Constructs	DT	DC	DE	DJA	DL	DTV	IWB
Digital Training	0.854						
Digital communication	0.478	0.849					
Digital engagement	0.241	0.399	0.804				
Digital job autonomy	0.37	0.564	0.255	0.846			
Digital leadership	0.215	0.357	0.618	0.244	0.778		
Digital task variety	0.216	0.361	0.61	0.227	0.987	0.778	
Innovative work behaviour	0.304	0.43	0.713	0.337	0.494	0.493	0.882

Notes: DT: Digital training, DC: digital communication, DTV: Digital task variety, DJA: digital job autonomy, DE: Digital engagement, DL: Digital leadership, IWB: innovative work behaviour

4.7 Structural model

Structural model helps to analyse the causal relationship between variables be it direct or indirect. All ten-hypothesis including the direct hypothesis and the mediation hypothesis were tested in SmartPLS 4.0. A bootstrapping technique is adopted with 5000 resamples and two-tailed method. The two-tailed method is used in models where there is a mediator involved.

4.7.1 Hypothesis testing

The results of hypothesis testing are presented in table. We hypothesized that digital training has a positive impact on digital engagement of employees. Results show that this relationship is insignificant (H1: $\beta=0.085$, $p=0.081$, $t=1.744$). Further, it was hypothesized that digital communication has a positive direct impact on digital engagement of employees, while results have supported this hypothesis with a significance level less than 0.05 (H2: $\beta=0.179$, $p=0.002$, $t=3.14$). Our third hypothesis was that digital task variety has a positive direct impact on digital engagement, this was proved by results as well with a significant t and p value (H3: $\beta=0.6$, $p=0.00$, $t=13.64$). Fourthly it was hypothesized that digital job autonomy has a positive influence on digital engagement (H4: $\beta=0.058$, $p=0.339$, $t=0.956$). However, it was not supported after analysis results as significance value was more than 0.05. Moreover, it was hypothesized that digital engagement has a positive direct impact on digital leadership capabilities of employees which was proven right (H5: $\beta=0.676$, $p=0.00$, $t=18.66$). Lastly it was proposed that digital leadership has a positive direct impact on innovative work behaviour and results supported this proposition (H6: $\beta=0.611$, $p=0.00$, $t=15.3$).

Table 4: Results of structural model assessment

Hypothesis	Beta	STDEV	*t* Value	*p* value	Decision
H1: Digital training -> DE	0.085	0.049	1.744	0.081	Not supported
H2: Digital communication -> DE	0.179	0.057	3.140	0.002	Supported
H3: Digital task variety -> DE	0.600	0.044	13.646	0.000	Supported
H4: Digital job autonomy -> DE	0.058	0.060	0.956	0.339	Not supported
H5: Digital Engagement -> DL	0.676	0.036	18.667	0.000	Supported
H6: Digital leadership -> IWB	0.611	0.040	15.311	0.000	Supported

Notes: DT: Digital training, DC: digital communication, DTV: Digital task variety, DJA: digital job autonomy, DE: Digital engagement, DL: Digital leadership, IWB: innovative work behaviour

4.7.2 Mediation hypothesis

The mediation hypotheses were tested and the results were as presented in Table 5. It was hypothesized that digital training has an indirect impact on innovative work behaviour of employees with the serial mediation effect of digital engagement and digital leadership (H7a). However, this hypothesis was not supported by the results. Results indicated a significance value of 0.095 which was above the 0.05 value of significance (H7a: β=0.035, p=0.095, t=1.671). Moreover, t value for this hypothesis is below the threshold value of 1.96 therefore the relationship is insignificant. Secondly, we hypothesized that digital communication has an indirect relationship with innovative work behaviour of employee through the serial mediation of digital engagement and digital leadership (H7b). Results supported the hypothesis and proved the relationship between digital communication and innovative work behaviour is serially mediated (H7b: β=0.074, p=0.009, t=2.628). Thirdly it was hypothesized that digital task variety has an indirect relationship with innovative work behaviour of employee which is serial mediated by digital engagement and digital leadership (H7c). Results from our analysis prove that the hypothesis is supported with a significance value less than 0.05 (H7c: β=0.247, p=0.00, t=7.768). Fourthly, we proposed that digital job autonomy has an indirect relationship with innovative work behaviour of employee through the serial mediation of digital engagement and digital leadership (H7d). Results indicated insignificant relationship with a significance value of more than 0.05 and a t value less than 1.96 (H7d: β=0.024, p=0.335, t=0.964).

Table 5: Results of structural model assessment (Mediation hypothesis)

Hypothesis	Beta	STDEV	T value	P value	Decision
H7a: DT -> DE -> DL -> IWB	0.035	0.021	1.671	0.095	Not supported
H7b: DC -> DE -> DL -> IWB	0.074	0.028	2.628	0.009	Supported
H7c: DTV -> DE -> DL -> IWB	0.247	0.032	7.768	0	Supported
H7d: DJA -> DE -> DL -> IWB	0.024	0.025	0.964	0.335	Not supported

Notes: DT: Digital training, DC: digital communication, DTV: Digital task variety, DJA: digital job autonomy, DE: Digital engagement, DL: Digital leadership, IWB: innovative work behaviour

CHAPTER 5

DISCUSSION OF FINDINGS

5.1 Chapter introduction

This chapter begins with the recap of the objectives, method and results obtained for this research. Followed by this it provides a summary of the results and hypothesis testing. Each of these results are then explained in detail with the help of previous literature. In addition to this this chapter ends with practical contributions, managerial implications for organizations and the theoretical contributions made through this research. At the end of this chapter we mentioned regarding the limitations of this study and suggested future researchers regarding further study on this topic.

5.2 Recapping

The aim of this research was to examine the relationship between digital job resources and employee outcomes. The digital job resources that we used are digital training, digital communication, digital task variety and digital job autonomy. Whereas the employee outcome chosen for this research is innovative work behaviour of employees. This study explains the relationship of digital job resources with employee innovative work behaviour in context of job demands resources theory. Considering digital job resources as resources provided by organization and innovative work behaviour as positive outcome resulting from the resources.

We used quantitative methodology to conduct this research. Data collection was carried out through online and physical means using questionnaires. Data was collected from technological professionals working full time in organizations, these employees should have maximum involvement of technology in their work tasks. A total of 345 responses were obtained out of which 38 responses were excluded, since they were not in accordance with the set criteria. Results were analysed using Smart PLS, partial least structural equation modelling was performed to test the hypothesis. We proposed ten hypotheses in our study, whereas six of them have been accepted and four out of ten were rejected.

5.3 Summary of results

Table 6: Summary of results

	Hypothesis	Decision
H1	Digital training has a positive impact on digital engagement	Not supported
H2	Digital Communication has a positive impact on digital engagement	Supported
H3	Digital task variety has a positive impact on digital engagement	Supported
H4	Digital job autonomy has a positive impact on digital engagement	Not supported
H5	Digital engagement is positively related to digital leadership	Supported
H6	Digital leadership is positively related to innovative work behaviour of employees	Supported
H7a	Digital training has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.	Not supported
H7b	Digital communication has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.	Supported
H7c	Digital task variety has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.	Supported
H7d	Digital job autonomy has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.	Not supported

Hypothesis 1: Digital training has a positive impact on digital engagement.

We proposed several job resources for the purpose of this research. One of these digital job resources include digital training. Although digital training is considered as job resource in this study (Nawaz et al., 2014). However, the results are contrary to our assumptions, and they show that digital training does not have an impact on the digital engagement of employees. Some scholars have argued on the point that the purpose of training on new technologies, their use and the skills to drive better results from these are dependent on other factors as well. An employee will be better engaged with the technology if the training reduces the overload that

the employee is facing, otherwise it is considered inefficient (Köffer, 2015). Researchers state that there are different segments of employees, only some part of these employees feels productive when working on social media/digital media whereas other employees may not be affected. Similar to this we can state that training employees for digitalization, they may not have significant positive impact on their engagement with the technology. A study by Cadman (2013) stated that employee training is mere ticking a box i.e., considered as a formality from the part of human resource management. It does not often build the competency that is required thus is considered ineffective. Similarly Shinbaum et al., (2016) quoted that most of the times when are trained on new a standard across the company, it is considered as an obligation rather than genuine investment. Therefore, this clarifies why certain employee trainings do not result in intended outcomes.

Additionally the digital training is focusing on the aspect of digital platforms and digitalization, which is why a rapid transition might not be acceptable by the employees (Tsaur & Hsieh, 2020). Another point that should have been considered in this scenario are the other factors that relate to the study. A recent study evaluated the impact of information and training on engagement through technology acceptance model. Here we can argue that technology acceptance plays a role here. Such that the usability, user experience, user acceptance of the technology adopted, and the ethics might be important for the dynamics of the relationship. The digital systems might not be effective enough to make the point of training as valid. Thus, resulting in no digital engagement (Molino et al., 2020).

There are many reasons that digital training did not have an effect on digital engagement of employees. Firstly, digital training is not often considered as an opportunity by many employees as they think of this training as an additional responsibility and complete it just for the sake of it (Tsai & Yen, 2020). There are chances that the training provided is not adequate to cater the complex problems that the employees face with technology (Marler et al., 2006). If the training is not relevant enough there might be no interconnectedness among these two concepts: digital training and digital employee engagement. Secondly, when discussing regarding digitalization there is a lot of resistance to change from the employees of the organization towards rapid adoption of technology, which is why digital training may not be considered effective. As a result of this resistance, employee may not consider the training as an important aspect of job resulting in negligence. Thirdly, there may be some misaligned goals because of which there can be concern regarding lack of clarity. With misalignment there

cannot be considered any relationship between employee digital training and the employee goals. It is necessary to keep the employees and the company initiatives on one page and communicate them beforehand, this sends a clear message regarding the aim of the investment by organization (Brown & Sitzmann, 2011).

Hypothesis 2: Digital communication has a positive impact on digital engagement.

The second proposition of our research was that, with the increased digital communication there will be increased digital engagement among employees. Digital communication is a term widely used with respect to customers and their engagement with the social media of any company to promote a brand image (Sashi, 2021). However, in this study digital communication refers to the collaboration among employees with the help of the digital platforms. We proposed that digital communication has a positive direct impact on digital engagement of employees. Some scholars have used the concept of digital communication from the perspective of employees own personal resource (Colladon et al., 2021). Whereas, in this study we aim to explain digital communication from the perspective of job resources in a such a way that the digital network and the intranet system that is available at companies that enable the employees to better communicate digitally. Therefore, the system effectiveness and efficiency to allow the employees to collaborate better is a job resource (Oberländer & Bipp, 2022).

Digital communication is one of the greatest resources for any company as it is the source of all the necessary information. Moreover, digital communications helps in better knowledge sharing. People can make the better use of technology. It allows companies to maintain an information ecosystem for completion of work tasks. The use of this digital media in order to communicate with each other builds better involvement. Thus, resulting in better interaction with the digital platforms (Grand et al., 2016). Researchers in their article have stated that digital communication and engagement have an interrelationship (Grand et al., 2016). It was further researched that the digital communication helps people to engage well and have a positive impact in their work (Chan, 2018). In other words, it can also be explained that with the presence of digital communication system it allows hindrance free interaction with others. For instance, now teams are more diverse and have employees from around the world (Soldatova et al., 2021). Therefore, it is pertinent that there may be some language barriers and cultural issues. Thus, in accordance with this a better enabled digital system at place allows

employees to interact with diverse workplace from all around the globe with ease (Grand et al., 2016). In addition to this scholars have also related communication over digital platforms as a feature of digital engagement (Grand et al., 2016).

With reference to the job demands resources model it has been proposed that with the presence of the job resources at workplace, employees feel engaged at work. In this study we have proposed that employees are more digitally engaged as a result for the digital job resources. Hence, digital communication does have a positive impact on the digital engagement of employees as the digital collaboration gives employees a relief and a feeling of interconnectedness (Chan, 2018). Moreover, employees feel motivated to work on their day to day tasks (Oberländer & Bipp, 2022). Employees consider the resource of digital communication as the social support provided by the organization to boost them in performing their activities. Digital communication not only enables the employees to interact with others through a seamless network and channel. But it helps organizations to interact with each other and make business communication flawless. Due to AI technologies digital communication is more cost effective nowadays and provides a real time experience to employee communicating (Sashi, 2021). In accordance with job demands resources theory, it can be discussed that digital communication is considered a resource that is provided by organizations to their employees. This resource can be provided to employees in the form of interconnected network to employees to collaborate with other employees and other company stakeholders as will (Lacarcel & Huete, 2023). This resource provides the employee a better insight regarding the system and processes of the organization. When employee get more into the interconnected organizational system that involves technology and digitalized network, the employee feels more digitally engaged. In such a way this digital engagement of employee is seen in the form of extra effort from the employee towards the digital platform (Horst & Miller, 2012).

Hypothesis 3: Digital task variety has a positive impact on digital engagement.

Digital task variety is known as the job characteristic that involves performing diverse variety of tasks digitally. In this study we have proposed digital task variety as one of the digital job resources that helps to improve the digital engagement of employees (Wood et al., 2019). Most of the employees in the organization today belong to millennials (generation Y). The employees of generation Y are those that value multitasking as it helps them in critical thinking (Usmani et al., 2019). Hence if the employees today are provided with multiple different tasks

of different categories and variety it motivates and energizes them more (George et al., 2020). The task variety is one form of the job enrichment. Job enrichment is known as "Meaningful change in job tasks by increasing opportunity for responsibility, personal achievement, feedback growth and advancement" (Norton et al., 1979, p. 1). It helps to increase the responsibility of the employees and their meaningfulness with the work (Froehlich et al., 2019). Thus, it can be explained from the concept of job enrichment that with the increased responsibility and motivation, offered through digital task variety it helps in better digital engagement as well (Niehoff et al., 2001; Wakhyunia & Agus, 2022).

A study by Shantz et al., (2013) proved that task variety plays an important role in the productivity and the quality of the employees and labour work as well. They used engagement as a mediator in this relationship and discussed that task variety improved productivity by first engaging employees in their tasks. Similarly, we proposed that the digital task variety (i.e., different digital tasks) helps the employees to be more digitally engaged with the platform and their job duties that are to be performed digitally by keeping them indulged in different tasks and responsibilities (Sonnentag, 2017). In addition to this previous study by Christian et al., (2011) have studied the impact of job characteristics like that of task variety with engagement and performance and found a direct significant impact on engagement. Most of these studies have explained the positive influence of task variety with engagement through job characteristics theory (Egbe & Caroline, 2023; Saks & Gruman, 2014).

From the perspective of the theory of job demands and resources, it can be argued that if the employees working in organization are acquiring the resource in the form of job enrichment. This will be considered as a resource such that it helps the employees build skills and be involved with various tasks (Lee et al., 2020). The variety of tasks allows multiple perspectives to the employees and broadens their critical thinking abilities (Achilov, 2017). In addition to this, when an employee gets involved in different variety of tasks it keeps the employee involved with the work and organization in general (Egbert, 2020). Since we are dealing with digital tasks in this research, the digital task variety will lead the employee towards more digital engagement (Saks, 2019). The digital engagement will further develop his interest in variety of things, employee will think about various issues and critically analyse the system (Avgerinos & Gokpinar, 2018).

Hypothesis 4: Digital job autonomy has a positive impact on digital engagement.

Another form of job enrichment is the job autonomy. Job autonomy refers to the freedom given to employees to make their own decision while performing their duties (Muecke et al., 2020). While digital job autonomy means the freedom that the employee has in dealing with his tasks and responsibilities while using digital technologies. The digital job autonomy does not necessarily guarantee that this autonomy given to employee will lead to their digital engagement (De Spiegelaere et al., 2014). Similarly, digital job autonomy can be empowering for some of the employees however without adequate supervision and guidance from supervisors and manager the employee may not feel a boost in engagement (Gerten et al., 2019).

Some of these employees may not feel empowered rather might feel overwhelmed by a lot of autonomy and less check and balance on them. This autonomy if not balanced with other resources it is of no use (Zhou, 2020). These other resources can include the opportunity and chance to grow and learn. Another resource can be a cooperative culture where there is reasonable amount of work burden on employees (Karimikia et al., 2020). Only by providing autonomy it might have been considered by employees that there is a lot of added responsibility on them. Secondly, without the opportunity to grow in the form of a career ladder, this autonomy may feel like a pile up of tasks without any accomplishment (Yucel, 2019). Therefore, the employee may take the autonomy as an obligation and fulfil that instead of being digital engaged with the system (Pattnaik & Sahoo, 2021).

Hypothesis 5: Digital engagement is positively related to digital leadership.

We proposed that digital engagement of employees leads to digital leadership capabilities within them. This hypothesis was supported by results. Digital engagement is known as the cognitive physical and emotional energies that the employees spend on the digital platforms in order to complete their tasks (Horst & Miller, 2012). Whereas digital leadership in this study means the ability of the leader to leverage the digital insights and through their better decision-making they leverage the digital capabilities of the organization (Abidin, 2023). Our proposition regarding the relationship between digital engagement and digital leadership can be explained from the point that the more employees expend their effort on the digital platforms and technologies, the more they will learn about the capabilities of the system. Thus, these employees will encounter more ways to leverage the resource present in the form of digital systems (Jesuthasan, 2017; Sawy et al., 2020).

Some scholars have argued that when employees engage with new technology and ICT system, they start to explore the system. While exploring they may take risks, perform different experiments, and try new innovative ideas (Srimata et al., 2019). This ability after engaging with the systems builds technical prowess in them. This is developed by being involved and immersed cognitively, physically and emotionally with the digital platforms (Kane et al., 2016). Whereas technical prowess is one of the capabilities of digital leadership (Karippur & Balaramachandran, 2022). With the help of this discretionary effort that is expended by the employees, it allows them to explore different paths and discover new ways to derive better results. Thus, the leadership capabilities allow employees to explore deeper, involve others to gather new perspectives. With the global vision these employees can then lead a team towards the goal (Brock & von Wangenheim, 2019). Another study by Corte et al., (2019) in his book of leadership states that digital leadership is the necessity for employee engagement. It is crucial for the leaders to be themselves engaged to some extent so that they can lead others to a goal and make others engaged as well.

Hypothesis 6: Digital leadership is positively related to innovative work behaviour of employees.

It is agreed by previous and recent studies that leadership has a direct relationship with innovation and innovative work behavior of employees. Most of these studies including some recent work are based on transformational leadership (Karimi et al., 2023). We hypothesized that digital leadership has a direct impact on innovative work behavior of employees which is supported by results. It is explained that transformational leaders motivate the employee through inspirational motivation and with the help of new ideas they foster innovative work behaviour of employees as well (Afsar & Shahjehan, 2018; Afsar & Umrani, 2019; Sutardi et al., 2023). The concept of digital leadership is somewhat more closely related to transformational leadership than any other leadership. As both these leadership style involve transformation of the processes and system (Antonopoulou et al., 2021c). The difference lies in the context of the transformation. While transformational leadership focuses on transforming processes and activities within the organisation to achieve profitability, digital leadership is regarding transformation of the information technology within the company. So it is a leadership style that focuses on digital transformation (Antonopoulou et al., 2021b).

Since these concepts are somewhat similar we can relate digital leadership with innovative work behaviour as digital leaders are focusing on transforming and creating new ways to exploit the digital resources of a company (Antonopoulou et al., 2021a; Junita, 2019). However, there is a slight difference in our study, we are focusing on employee's ability to act as digital leaders. Whereas through this digital leadership capability they develop more innovative work behaviour (Afsar & Umrani, 2019). In addition to this Erhan et al., (2022) explained digital leaders can play a part in triggering their innovative selves and their followers at work. Through the power of influencing others and motivating them towards a global vision. Moreover, with this vision comes the pathway to achieve vision as well. Erhan et al., (2022) further argued that digital leadership capabilities within anyone has a direct and positive relationship with idea generation, idea exploration, idea championing and idea implementation (i.e., four components of innovative work behaviour). This research and relationship significance has been further explained by various studies (Benitez et al., 2022; Borah et al., 2022). However Benitez et al., (2022) empirically tested that the relationship between digital leadership and innovative work behaviour can be further improved with the help of a mediator like platform digital capability (Guzmán et al., 2020). They further elaborated, that digital leaders are capable of triggering the innovation performance in a better way once they are digitally engaged (Coun et al., 2021; Santoso et al., 2019).

Hypothesis 7a: Digital training has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

It has been proposed that digital training has a positive indirect impact on innovative work behavior. The results did not support our hypothesis. Results show that there is no indirect relationship between digital training and innovative work behaviour through serial mediation effect of digital engagement and digital leadership. Firstly, our hypothesis H1 has been rejected, which stated that there is a direct relationship between digital training and digital engagement. Additionally, for this research results show that there is no direct relationship between digital training and innovative work behaviour of employees as well (Molino et al., 2020). Thus, it can be proved that the serial mediation effect of digital training, digital engagement, digital leadership, and innovative work behaviour is insignificant.

One of the reasons that digital training does not have an indirect effect on the innovative work behaviour is such that the employee perception of training offered in organization might not be

satisfactory enough. Since most of our samples were employees having strong technical background and understanding. Moreover, these employees were having most part of their jobs that are to be performed using complex technologies and digital systems (Bos-Nehles & Veenendaal, 2019). In addition to this, since the employee did not feel digital engaged through the training, there was very little possibility to trigger their digital leadership capabilities. Moreover, since digital training is not playing any part in upskilling employees towards their goals, the training did not engage them digitally and it did not enhance their digital leadership abilities, thus the employees did not innovate (Sheeba & Christopher, 2020).

Hypothesis 7b: Digital communication has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

We have proposed in this research that digital communication has an indirect relationship with innovative work behaviour. This indirect relationship is serially mediated by digital engagement and digital leadership. Results have supported our hypothesis. Results have also proven that digital engagement has a direct relationship with digital leadership, and digital leadership has direct relationship with innovative work behaviour. Therefore, the serially mediated effect of digital communication and innovative work behaviour via digital engagement and digital leadership is justified. This relationship can be explained such that digital communication as a job resource provides employees with the social support and an interconnected network to collaborate with others effectively for their digital tasks (Chan, 2018). The digital communication as a resource helps the employees to be more digitally engaged with the network and their tasks (Nguyen et al., 2022).

Digital communication would help the employee to collaborate with different employees throughout the globe and experience new ways and techniques of working. Through this collaboration employees can get new perspectives regarding work and advanced ways to open horizons of digitalization in organization. Thus, the employee would exert extra effort regarding digital tasks and be involved with more people to come up with advanced techniques, leading to more digital engagement (Köffer, 2015; Liu et al., 2019). This digital engagement helps employees to delve into the technologies at place within the organization. Which enables the employees to envision long term goals for the company in order to leverage the technologies for the benefit of organization. The vision facilitates them to derive new ideas and creative ways to solve problems and invent creative work-related practices (i.e., innovative work

behaviour). This envisioning is the sign of digital leadership in the employees that enables them to lead the change and the digital transformation in the workplace. Moreover, there is a direct relationship between digital communication and innovative work behaviour of employees. However, the degree that digital communication impacts innovative work behaviour is stronger when it is serially mediated by digital engagement and digital leadership (Pokrovskaia et al., 2021).

Hypothesis 7c: Digital task variety has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

Digital task variety is proposed to have an indirect relationship with innovative work behaviour. Results show that digital task variety does have an indirect relationship with innovative work behaviour in presence of two serial mediators. These mediators include digital engagement and digital leadership. It has been established by previous and recent studies that work design matters when referring to the employees engagement, motivation and performance (Peiró et al., 2020). Researchers have mentioned that when dealing with technology and digital workplace it is important to consider the work designs as they shape the employee's behaviour at work (Parker & Grote, 2022). Similarly in this case we are considering task variety as one of the work designs. In addition to this other researcher have mentioned the use task variety in the work design as one of the agile practices adopted by organizations. These agile practices are considered as a resource for the employees in organization (Malik et al., 2021).

Thus, considering the task variety as a resource and an opportunity to learn, the employees develop digital leadership capabilities by being digitally engaged due to variety of digital tasks. Followed by the digital leadership employees get creative ideas and innovative suggestions that can result in benefit for the long run (Kwon & Kim, 2020). With more tasks to be performed it opens employee's mind and allows them to think in detail multiple perspectives. With the amount of variety of tasks comes a good variety of skills for the employees as well. Moreover, with this variety of tasks it keeps the employee to busy and occupied all day (Gabriel & Aguinis, 2022). This involvement in multiple tasks lead to employee being digitally more engaged with work. The digital engagement in addition to the variety of different skills gained by working on different tasks allows the employee to gain insight regarding future with technological advancements (Zhang & Parker, 2019).

With the mindset of digital transformation, the employee develops capabilities of digital leadership after being fully engrossed in work. Followed from the digital leadership and the task variety offered to employees, it leads to innovative work behaviour, combined with various skills and motivation to work and lead through digital transformation journey of an organization. One of the previous scholars Afsar et al., (2019) conducted a study regarding the role of job crafting on the innovative work behaviour of employees. It was deduced from the results that there is a relationship between job crafting and innovative work behaviour. This is possible in such a manner that if we increase the job challenges of employees it results in greater efforts from the employees. As a result of this they brainstorm more regarding new ways in which tasks can be completed and the processes can be made efficient and thus lead to innovative work behaviour. We have explained these greater efforts in the form of digital engagement and creative self to transform the technology for better use as digital leadership.

Hypothesis 7d: Digital job autonomy has a positive indirect impact on innovative work behaviour which is serially mediated by digital engagement and digital leadership.

Further, it has been hypothesized that digital job autonomy has a positive indirect relationship with innovative work behaviour which is serially mediated by digital engagement and digital leadership. However, this hypothesis is proved wrong. Firstly, results show that there is no direct relationship between digital job autonomy and digital engagement (H4). Secondly, digital job autonomy has no direct or indirect relationship with either digital leadership or innovative work behaviour. Therefore, this can be one of the reasons why there is no presence of serial mediation. One of the study by De-Spiegelaere et al., (2016) proved that not all types of autonomy are same and they depend upon the contextual scenarios and employee attitude in order to be effective. Moreover, a study conducted by Ramamoorthy et al., (2005) proved that there is only a partial relationship between job autonomy and innovative work behaviour which occurs only in the presence of obligation to innovate. However, in our study we have not used any obligation to innovate for the employees as we are referring to direct employee driven innovative behaviour. We believe if there will be an obligation to innovate it might be occurring for any positive reinforcement (e.g. incentives) or negative reinforcement by the organizations (De-Clercq & Brieger, 2022).

Previous studies conducted research on job autonomy of employee and innovative work behaviour found that job autonomy is having an indirect relationship with innovative work

behaviour in the presence of mediators. A study by Lee & Kim, (2021) discussed that the relationship between job autonomy and innovation of employees depends on the mediating impact of psychological ownership by the organization. Shakil et al., (2021) researched regarding innovative work behaviour of employees and found a direct relationship with job autonomy. However, this relationship was due to prevailing occurrence of inclusive leadership within the organization. They discussed that use of inclusive leaders can promote job autonomy of employees, as a result of which they develop innovation among employees. Another study by Hassi et al., (2021) argued that the relationship between job autonomy and innovative work behaviour is based on the variables that leads to job autonomy i.e., empowering leadership. Additionally various studies have examined the relationship of job autonomy in the presence of knowledge sharing of employees or culture, which is why the relationship has been significant (Lu et al., 2012; Wang & Noe, 2010). Nevertheless, we have not used the concept of knowledge sharing in our study.

Thus, there are not many studies that have proved a direct relationship between job autonomy and innovative work behaviour in the absence of other factors. Moreover, the number of condition and serially mediated effect is too complex in our study that it is not possible for all employees in organization to be digital engaged as a result of digital job autonomy. Followed by the engagement for employees to exhibit digital leadership abilities. As there are other factors that might be at play here like that of culture, leadership in organization and employee attitude etc. (Muecke et al., 2020).

5.4 Implications

5.4.1 Managerial implications

It is advised to managers to provide digital resources to employees that are a fit with their skills and are useful to them. For instance, if organizations arrange special digital training for employees, they must first ensure that the training program is effective for them. There are various ways to ensure if a training program is effective (Edly, 2022; Waern, 2022). Firstly, it is important to conduct training need analysis, to determine which employees need digital training. Secondly, identify which deficiencies exist in employee with respect to digital platforms, its usage and employee skills. Thirdly, is to develop a plan for training, followed arranging the training material and then deliver the training. It is crucial that the employees are involved in each step of training (Team, 2021). In case at any point, it is perceived by

employees that the digital training is ineffective, it must be reversed or revised. For this purpose, it is necessary to take regular feedback from employee regarding their opinion and develop training programs based on that (Getachew et al., 2020).

Additionally, it is suggested for managers to make arrangements to keep the employees digitally engaged (Caramela, 2023). From the findings of our study, we can argue that use of digital job resources would help the employee to be more digitally engaged. It is important to keep employees digitally engaged to keep their work extraordinary and derive visible results for the business from employee's performance. Since digital engagement would ultimately lead to digital leadership and innovative work behaviour it can help organizations in their digital transformation (Oberländer & Bipp, 2022).

The digital job resources that organizations must provide to improve employee digital engagement include digital communication, digital task variety etc. Starting with digital communication there are various ways to provide it as a job resource to employees. Firstly, managers can ensure the installation of an advanced SAP system into place. This SAP system engages and keeps the employees connected globally and organization wide. Secondly, some organizations use different hosting platforms to manage the communication between their employees for instance some organizations use technologies like Webex, zoom slack etc. Hence, companies can invest in such interconnected systems (Gillis & Essex, 2022). Thirdly, there is a going trend for chatbots, where employees can get their queries answered. Chatbots can be customized with respect to certain organizational issues and concerns and deals with employee issues in the best manner possible. Fourthly, managers can ensure good digital communication within organization by implementation of digital signage, which refers to the digital displays that are made within the workplace to make important announcements etc. Since most of the workplaces are hybrid nowadays, hence use of digital signage can help the employees interconnected with each other (Burke, 2009).

Another resource that managers can take care of is the digital task variety. Digital task variety is more of an opportunity to learn and grow as a resource. With the help of digital task variety employees are able to acquire new skills, broaden their critical thinking and innovative horizons and improve themselves. Some of the ways companies can manage the digital task variety of employee are the following. Firstly, arranging webinars, conferences and short courses (e.g. Harvard courses) can help improve the digital engagement of employees by

keeping them occupied. Moreover, this is an effective technique to teach new updated skills to employees. These certifications can keep them motivated and feel connected with the organization as well, as they would convey a meaning of investment by the organization in the employee development. Secondly, digital task variety can involve job rotation of an employee. As continuously working on monotonous tasks often leads to frustration. Thus, with a changing role and new responsibilities employee will have the opportunity to switch between tasks. The changing of tasks also helps to keep the employee to work with fresh mind. Thirdly, the concept of cross functional teams is quite common in organizations today. Hence, companies can arrange cross functional virtual teams of employees to work on projects. Not only would new projects improve work quality for employee but contribute to the digital communication skills of employees as well. Moreover, with these resources, it is important for managers to provide them opportunity to lead and exhibit innovation in their work tasks (Froehlich et al., 2019).

Since there is a huge lag in the digital transformation journey of Pakistani organizations. This research will help Pakistani organizations to realize the importance of digitalized system at workplace. Additionally, this study can provide them deeper insights into how to implement the system into organizations for its effective results. Furthermore, an article states that the lag in digitalization throughout Pakistan is mainly due to the frequent changes in leadership at place (Gilliard, 2020b). Therefore, this study helps to provide a guideline for organizations to develop their employees as digital leaders so that they do not have to rely on their upper management for guidance. By providing the necessary digital resources to employees, organization can enhance the digital leadership capabilities of employees by first focusing on their digital engagement. Thus, with the help of organizational employees as digital leader's despite of their job position, they can strive faster for the digital transformation journey (Lim, 2022).

5.4.2 Theoretical implications

This study has various contributions to recent literature. Firstly, this research examined the serial mediation effect of digital engagement and digital on the relationship between digital job resources and employee outcome (innovative work behaviour). The concept of digital leadership has gained importance after the rise of industry 4.0. However, there are numerous studies that have worked on digital leadership capabilities of organization. We have worked on

the digital leadership abilities of employees in organizations (Araujo et al., 2021; Kane et al., 2019).

Additionally, this study contributes to the discussion of digital engagement. There are no to very limited studies that discussed the concept of digital engagement (Horst & Miller, 2012). Wherever the concept is discussed it is discussed from the point of digital engagement of customers on social media to get their attention. It is often related with the branding concepts to engage customers. Whereas this research focused on the aspects of digital engagement of employee on the digital platforms and company interconnected network. Moreover, this research is focusing on the influence that digital engagement has on digital leadership capabilities. Whereas, in the past studies the reverse relationship is mostly discussed (i.e., impact of digital leadership on digital engagement). Since we are referring to digital leadership abilities of the same employee who is digitally engaged it is therefore another contribution to literature. As most of the researchers have focused on employees and managers as separate entities.

In addition to these, this study is focusing on the variables that result in innovative work behaviour. These variables are the digital job resources provided by organizations to employees. The discussion regarding digitalization of variables and the digital job resources impact on innovative work behaviours is an addition to literature as it inspects the underexamined part of innovation in organizations nowadays in the era of digitalization (Wasono & Furinto, 2018; Zhu et al., 2022). Other studies focused on the employee behaviours aspect and explained impact of organizational and individual characteristics that might lead innovative work behaviour (Kwon & Kim, 2020; Ramamoorthy et al., 2005). Thus, the addition to digital aspect provides a new viewpoint.

5.5 Limitations

This research has several limitations of this study. Firstly, this study is based on technological professionals i.e., employees that must use technology on a daily basis to complete their tasks. Which is why this research did not separate the industry wise experts and employees which might have resulted in different outcomes based on the type of industry. It is possible that the industry wise results might be different, as all these industries have a lot of differentiation with respect to technology integration in their organizational systems. Such differences can be

observed in Pakistani context as most of the software houses, IT sectors etc have equipped their employees with developed integrated systems. Whereas most of the educational sector, health sector specially government institutions have minimal integration of technology, and they still operate manually for most of their tasks (Nisar & Munir, 2011; Ud Din et al., 2017). Secondly, this research was conducted at one point in time i.e., cross sectional research. Although this type of research had its own pros in the form of time management and keeping a track of participants. However, since this study is based on organizations providing digital resources it is possible that visible outcomes are observed after a period i.e., following a time lag study (Robledo et al., 2019).

Thirdly, this study has been conducted in the form of questionnaires that are self-reported. Self-reported data often leads to complex interpretation and provides us with one sided view (Dahlgaard et al., 2019). For instance, in our study, we have inquired regarding the digital job resources from the employees and regarding the employee outcomes from the employee as well. There are chances that the employee may exaggerate the employee outcomes to portray a positive self-image. Similarly, the employee might perceive negatively regarding the organizational input and might portray a negative image of the company via the survey. Thus, these sorts of issues are common in self-reported data and leads to more chances of bias and errors in data (Dahlgaard et al., 2019).

Fourthly, data collection was collected from technological professionals. Whereas nowadays most of the technological professionals are from generation Z and generation Y (Millennials) who belong to the age range of 21-30 years old. Therefore, the data collected is mostly from the employees that belong to this age range. Lastly, we have used quantitative method of data collection. Although the topic of our study demanded a quantitative method for greater and direct interpretation of data and more feasibility. But by the addition of different perspectives of employees from all levels in organization, data collected from various regions in Pakistan and focusing on different industries independently, a qualitative study would be better. In a qualitative study different segments could be made for each category that would have resulted in better understanding regarding differences in respondents and their characteristics (Moroi, 2020; Thottoli & Ahmed, 2019). Moreover, he other digital job resources that might help in building digital leadership would have been explored. It would further elaborate the concept of digital leadership within employees of organization (Karippur & Balaramachandran, 2022).

5.6 Future directions

It is suggested for future studies to conduct research in a time lag way. This method of conducting research is such that one variable is collected at one point in time and the other variables are followed after a period of time. However, the respondents are same, but it helps with the common method bias and other bias that emerge due to self-reported data. Another addition that future studies can make is to collect data from multiple sources; supervisor rated, peer-rated and employee rated. Multiple rated data can involve different perspectives regarding one concept and will provide better insights regarding the outcomes that were proposed.

Moreover, future studies can include the aspect of knowledge sharing culture as a moderator in the relationship between digital job resources and the digital engagement. As knowledge sharing plays an important part with respect to increasing employee engagement (Drummond et al., 2020). Thus, future studies can observe how the knowledge sharing culture can change the dynamics of digital employee engagement. Not only this but knowledge sharing is strongly related to digital leadership capabilities of employees as well. As knowledge sharing is considered an important competency when relating with digital leadership (Khaw et al., 2022). Likewise, with reference to previous studies knowledge sharing does have a significant relationship with innovative work behaviour (Pian et al., 2019). So, an interesting study could have resulted by combining knowledge sharing culture and digital job resources in the same study. A different interpretation of the outcome variables can be obtained via addition of knowledge sharing concept.

Furthermore, future studies can relate the variable of technostress of employees as well. Since our results proved that some of the digital job resources we inculcated in our model (i.e., digital training and digital job autonomy) had no effect on the digital engagement of employees. Therefore, future studies can incorporate the element of technostress to see if this relationship might be affected by the stress (Ewers & Kangmennaang, 2023; Fleischer & Wanckel, 2023). There are chances that employees might feel insecure with the rapid digital transformation and might not be able to exhibit digital leadership capabilities (Sethi et al., 2022). Moreover, since this study had majority participants from the age range 21-30 years. Future studies can focus on other generations and different age range which might result in interesting findings.

Additionally future studies are recommended to conduct the same study on completely remote employees only. Since the main aim of this research is to look for digital leadership and innovative work behaviour in employee. The patterns of digital leadership capabilities might vary in remote employees as they would have more time on technology than the regular ones (Bowen & Pennaforte, 2017). This is due to the limited options for remote employees to communicate with other colleagues except for digital technologies. They connect with others through digital platforms as a necessity. Furthermore, remote employees might feel differently regarding the other digital job resources provided to them. Therefore, they may act differently in response to such job resource availability (Cakula & Pratt, 2021).

5.7 Conclusion

This research aimed to identify the influence of digital job resources of employee innovative work behavior. These digital job resources include digital training, digital communication, digital task variety, and digital job autonomy. Interestingly the findings proved two serial mediation hypothesis which were the impact of digital task variety on innovative work behavior and digital communication on innovative work behavior through serial mediation of digital engagement and digital leadership. While it rejected other two serial mediation hypothesis for digital training and digital job autonomy. This research contributes to prior literature by examining new variables like digital engagement and digital job resources. Moreover, it provides insights to managers to develop digital leadership within their employees for greater innovation and for rapid digital transformation.

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APPENDIX

Section 1: Demographic Information

1.	Gender	☐ Male ☐ Female ☐ Others
2.	Age (Please Specify)	☐ Below 20 ☐ 21-30 ☐ 31-40 ☐41-50 ☐Above 50
3.	Qualification	☐Intermediate ☐ Bachelor ☐Master ☐ PhD ☐Professional Certifications ☐Others
5.	Industry/Sector (e.g., Telecommunication) *Please specify*	
6.	Job Position (e.g., Technologist) *Please specify*	
7.	Level in organization (e.g., Senior Management)	
8.	Years of experience (in current organization)	☐ Below 1 year ☐ 1-3 years ☐ 4-6 years ☐ 6-10 years ☐ above 10 years
10.	City (Current city of work)	
11.	At workplace, on average how much time do you spend using technology every day? *(In hours)*	

Section 2: Please tick ✓ a suitable option.

DIGITAL LEADERSHIP

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	I think using digital tools is fun					
2.	I am a digital expert					
3.	When it comes to digital knowledge, I am always up to date					
4.	I am driving the digital transformation forward proactively in our unit					
5.	I can make others enthusiastic about the digital transformation					
6.	I have a clear idea of the structures and processes that are needed for the digital transformation.					

DIGITAL TASK VARIETY

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. My job involves a great deal of task variety to be performed digitally.					
2. My job involves doing a number of different digital things					
3. My job requires the performance of a wide range of digital tasks					
4. My job involves performing a variety of digital tasks					

INNOVATIVE WORK BEHAVIOR

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I create new ideas for improvements during my work.					
2. I often search out new working methods, techniques, or instruments for my work.					
3. My ideas generate original solutions to problems related to my work.					
4. I work actively to test new ideas related to my work.					

DIGITAL COMMUNICATION

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I greet and ask about colleagues and acquaintances with polite words					
2. I use digital media as one channel for working with other people					
3. I assign or inquire about work from friends via digital media					
4. Digital media allow me to work with colleagues efficiently					

DIGITAL EMPLOYEE ENGAGEMENT

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
While performing the digital job task(s)...					
1. I am really focused.					
2. I give a lot of attention.					
3. It has a great deal of personal meaning to me.					
4. I feel a strong sense of belonging.					
5. I am willing to put extra effort on them without being asked.					
6. I really push myself to work on it beyond what is expected of me.					

DIGITAL TRAINING

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. My organization provides digital training opportunities.					
2. Digital training and development are encouraged and rewarded in my department					
3. Overall, the digital training I receive is applicable to my job					
4. Overall, the digital training I receive on the job meets my needs					
5. Overall, I am satisfied with the amount of digital training I receive on the job					

DIGITAL JOB AUTONOMY

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
In my digital job task(s);					
1. I have the freedom to make decisions.					
2. How it is done is essentially under my responsibility.					
3. I determine how it is done in line with my own opinions.					