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Does Technostress Moderate Between Intention to Use ICT and Innovative Behavior: Exploring Antecedents of Digital Mindset

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Abstract

This study aims to identify the factors influencing innovative behavior and digital mindset in Pakistani software houses while also examining the moderating role of technostress and the mediating role of the intention to use ICT. Data was collected longitudinally from 320 IT professionals employed in software houses in Pakistan, utilizing incremental and entity theories. A structured questionnaire based on a Likert scale was used to gather data, which was then analyzed using Smart-PLS to ensure accuracy and reliability. The findings reveal that a digital mindset, characterized by disruptive, generative, exponential, and combinational thinking, significantly impacts innovative behavior. Furthermore, the study shows a substantial mediating effect of the intention to use ICT on the relationship between digital mindset and innovative behavior. Additionally, perceived technostress is found to have a significant moderating impact on the intention to use ICT and innovative behavior. This research empirically develops and tests an integrated model of technostress, illustrating how a digital mindset can promote innovative behavior. The study's conclusions offer valuable insights for future research on employee behavior and technostress.

Keywords

Digital Mindset, Innovative Bahavior, Technostress

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1. Introduction

A software house, IT firm, or IT company is an entity that produces software products by providing its highly technical software professionals with the necessary environment and resources. Pakistan's IT sector is steadily expanding, with more than 2,500 IT companies employing highly qualified and educated IT workers, as reported in a 2017 survey (Ata & Khan, 2023; Kanike, 2023). These IT companies leverage existing talents and technology to meet the demands of the IT industry, offering software solutions aligned with customer expectations (Khalil & Taj, 2021). In addition to these services, IT firms contribute to the national economy by attracting foreign investment, generating revenue, and employing recent graduates of computer programs, as Pakistan produces more than 20,000 such graduates annually (Abrar et al., 2021). Researchers, project managers, and software engineers are keen to understand the factors influencing software development. Numerous factors that assist management in mitigating negative impacts and enhancing positive effects have been identified (Ata & Khan, 2023; Qaiser Danish et al., 2019).

The globalization of the 21st century has created new competitive pressures for the corporate world. The changing environment has compelled managers to manage their resources effectively to achieve desired outcomes (Malibari & Bajaba, 2022). In the current era, where firms must perform effectively in all areas to achieve and maintain competitive positioning, organizations find it increasingly challenging to remain competitive (Wang et al., 2021). To succeed, organizations utilize

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various resources, including technology, economies of scale, and natural resources, to address complex Challenges. A key resource for growth and success is the workforce, as organizations depend on the creative behavior of their employees to respond swiftly and effectively to market changes (Kwon & Kim, 2020). Organizational leaders have increasingly recognized the importance of advancing "innovative behavior" in employees (Zhang & Wang, 2021). While the relationship between innovative work behavior and various factors has been extensively studied, the connection between innovative behavior and ICT has received less attention.

In recent decades, the infrastructure for information and communication technologies (ICT) has significantly improved worldwide (Kanike, 2023). These advancements have profoundly impacted macroeconomic variables, such as economic growth, which in turn affect the environment. ICT development is now seen as a primary driver of economic growth. However, the relationship between ICT and its impact on employees, including their productivity and well-being, remains underexplored. By focusing solely on the immediate psychological effects of ICT use or the potential actions enabled by ICT, we risk overlooking the underlying processes within its social context, including the impact of technology on work (Ibrahim et al., 2020). In the workplace, ICT use affects user experiences and significantly alters individuals' relationships with tasks, colleagues, and the nature of their activities. ICT may fundamentally influence how employees approach their work (Harunavamwe & Ward, 2022). From this perspective, technostress emerges from an individual's inability to adapt to the demands of implementing or operating new technological processes. This struggle can be due to the cognitive and social demands of using new technology (Harunavamwe & Ward, 2022; Nastjuk et al., 2024; Toscano et al., 2024). While general beliefs about one's computer skills or the role of computers in society might contribute to technostress, negative experiences related to learning or using specific technological solutions are often the most significant source (Salo et al., 2022). Technostress negatively affects users (Upadhyaya & Vrinda, 2021); however, users can manage technostress effectively (Zhao et al., 2020). Factors such as increased capacity to handle complexity (Jurek et al., 2021), ability to find appropriate solutions (Ferreira, 2021), and reduced feelings of helplessness when using digital technologies (Chandra et al., 2019) enhance users' ability to manage the demands of digital technologies. This research explores how a digital mindset can mitigate the negative impacts of technostress.

Aligning with two research streams, we assume that people's perspectives influence how they respond to stressors. Therefore, to provide effective managerial interventions against technostress, we incorporate the concept of mindsets, particularly the digital mindset. Our approach is grounded in existing knowledge of creative behavior and the digital mindset. Theoretically, we propose models that explain how technostressors moderate the relationship between the intention to use ICT and innovative behavior and how the intention to use ICT serves as a mediator.

2. Literature review

2.1. Underpinning Theory

There are two primary implicit theories of intelligence concerning the nature and malleability of human attributes: the incremental theory and the entity theory (Miu & Yeager, 2015; Tiberio & Maci, 1994). The entity theory views characteristics as fixed, unchangeable traits, while the incremental theory posits that traits like intelligence are dynamic and developable. These theories are often categorized as a growth mindset and a fixed mindset. A growth mindset reflects the belief that human qualities can be developed through effort, while a fixed mindset holds that these qualities are immutable (Di Carlo, 2020). A mindset, defined as implicit beliefs about the malleability of human characteristics, significantly influences an individual's thoughts, feelings, and actions (Miu & Yeager, 2015). Mindsets are closely linked to various self-regulation processes, such as goal-setting and mastery-oriented strategies (Di Carlo, 2020; Seo et al., 2022). For instance, individuals with a fixed mindset often set performance goals aimed at validating their competencies, while those with a growth

mindset tend to pursue learning goals that focus on improving their abilities. These differing orientations can lead to distinct behavioral patterns. Individuals with performance goals may avoid challenges that could expose their limitations, often resulting in a tendency to give up when faced with difficulties (Di Carlo, 2020). Conversely, those with learning goals are more inclined to embrace challenges as opportunities for growth, leading to the development of mastery-oriented behaviors.

2.2. Hypothesis Development

Motivational theory suggests that a mindset is a domain-specific attribute consistent across situations but can be influenced and shaped over time. When activated in a specific environment, a mindset alters the perception, evaluation, and understanding of information, which impacts goals and triggers various reaction patterns. A mindset functions as a set of mental filters reflecting an individual's experiences, knowledge, and core beliefs, shaping their understanding of the world in particular contexts (Alabdali et al., 2024; Wong et al., 2022). Cognitive filters provide a perspective and rationale for interpreting the world (Aristizabal & Rasmussen-Moseid, 2020; Solberg et al., 2020).

Previous research has highlighted the positive influence of different mindsets on behavior, particularly concerning creative behavior. For instance, a growth mindset has been shown to impact behavior and reduce the negative effects of stress positively. Individuals with a mindset that filters stressors demonstrate reduced cortisol levels and are more likely to seek feedback to mitigate these effects. This type of mindset also diminishes the harmful impact of stress on mental health, leading to improved well-being and lower levels of anxiety and depression during stressful situations (Ferreira, 2021; Ibrahim et al., 2020; Van Zyl et al., 2021; Zhang & Wang, 2021). Moreover, attitudes play a crucial role in influencing employees' likelihood of experiencing positive outcomes, directly shaping behavior and mitigating adverse effects (Önhon, 2019). The development of new and valuable ideas is a complex process involving idea generation, combination building, and implementation. Individuals capable and willing to innovate fulfil their duties and consistently generate creative ideas (Ibrahim et al., 2020; Lukes & Stephan, 2017). A favorable correlation exists between innovative work practices and the influence of narratives (Su et al., 2020).

H1: A digital mindset (combinational, exponential, generative, and disruptive thinking) significantly impacts innovative behavior.

It is crucial to examine how individuals perceive the unique characteristics of digital technology that influence innovative behavior (Karatepe et al., 2020). Alternative ways of thinking, such as collaborative, platform, and iterative thinking, primarily explain how perspectives on digital phenomena and workplace changes have evolved, but these topics are beyond the scope of this study (Wang et al., 2021). This research also excludes thought patterns representing digitally unique modes of thinking, as these are equally applicable in modern work environments and not exclusive to digital technologies. For instance, risk-affine, collaborative, and iterative thinking are critical in these new work settings, but they are not confined to the digital domain (Valta et al., 2024) .

In response, a version of the digital mindset is developed that is tailored to this specific context. Employees with a stronger digital mindset tend to think more exponentially, generatively, combinatorially, and disruptively (Alabdali et al., 2024). For example, those with higher levels of digital mindset are more aware of the exponential and scalable advancements in digital technologies, enabling them to anticipate future developments and recognize associated potentials. Additionally, these employees can identify previously unintended, combinatorial, or fundamentally novel applications and solutions for digital technology compared to those with lower levels of digital mindset (Solberg et al., 2020). With enhanced combinatorial thinking and a higher digital mindset, they can swiftly evaluate the feasibility and desirability of integrating diverse technologies to solve problems or create opportunities (Forsythe & Rafoth, 2022; Hildebrandt & Beimborn, 2022). To understand ICT use at the individual level, this study adopts with conceptualization of same citation (Tang & Konde,

2020), which defines ICT use as "an individual user's employment of one or more features of an ICT to perform a task" (Ibrahim et al., 2020). This definition captures "ICT use in practice" (Rahiem, 2020; Seo et al., 2022; Van Zyl et al., 2021). Rather than simply "using something," the theoretical work suggests that the use of technology is a practice where users, social aims, and technological qualities are intertwined (Ferreira, 2021; Ibrahim et al., 2020). Therefore, "ICT use" behaviors can be explained by both the level of ICT usage and the manner in which ICT is utilized to complete tasks (Önhon, 2019). ICTs serve various functions, and it is essential to capture these functions as the impact of ICT on work may differ depending on its usage. Two fundamental ICT functions are identified: performing information-related tasks (production/task function or task focus) and interacting with others (social function or communication emphasis) (Kanike, 2023; Qin et al., 2021).

H2: A digital mindset (combinational, exponential, generative, and disruptive thinking) significantly impacts the intention to use ICT.

The emergence of digital technology, coupled with widespread digitalization, has necessitated new ways of thinking, collectively referred to as the "digital mindset" (Forsythe & Rafoth, 2022). This mindset shapes how individuals interpret events in the context of digital technology use, influenced by their experiences, knowledge, and core beliefs, which create cognitive filters (Valta et al., 2024). Mindsets are dynamic, and in the specific context of IT, the digital mindset can be considered a distinct and adaptable trait (Solberg et al., 2020). The digital mindset's IT specificity and its dynamic nature distinguish it from other traits (Allen, 2020; Aristizabal & Rasmussen-Moseid, 2020). Personal innovativeness in IT, and citation IT (Balci et al., 2022) while trait indicates a deliberate and consistent focus on IT, while traits like neuroticism are universally applicable and stable (Neeley & Leonardi, 2022). A growth mindset represents a trait that is universal yet continuously evolving (Wong et al., 2022), reflecting different degrees of context sensitivity and fluidity. To explore the link between the digital mindset and the effects of technostress, this study examines four specific thinking patterns: exponential, generative, combinatorial, and disruptive (Alabdali et al., 2024; Allen, 2020). These patterns are influenced by factors such as the absence of specific usage goals, the uncertainty of future progress, and the numerous possibilities for combining digital technologies (Balci et al., 2022; Solberg et al., 2020; Valta et al., 2024)

The formation of strains in individuals is significantly impacted by the specific stressors they experience (Ferreira, 2021), making it essential to understand how these stressors are perceived. A more sophisticated approach is needed to unravel the complex interplay between mindsets and stress perception, particularly in the context of digital technologies, which are the source of technostress. The digital mindset can potentially alter how individuals perceive these technologies (Seo et al., 2022; Van Zyl et al., 2021). This study's conceptualization is based on integrating multiple perspectives, using 11 ways of thinking derived from the characteristics of digital technologies and the resulting dynamic environment (Harunavamwe & Ward, 2022). Despite reports from practitioners on the benefits and applicability of the digital mindset—such as in decision-making, productivity, work performance, and satisfaction—empirical data remains scarce (Ferreira, 2021; Kanike, 2023). Qualitative findings indicate that a lack of a digital mindset increases perceptions of the complexity and unpredictability of digital technologies, contributing to technostress (Rahiem, 2020). Moreover, evidence suggests that their digital mindset influences individuals' behavior when interacting with digital technologies.

H3: Intention to use ICT mediates the relationship between digital mindset (combinational, exponential, generative, and disruptive thinking) and innovative behavior.

Many studies primarily focus on creativity or idea generation. However, as theory emphasises, innovation extends beyond idea generation to include the practical implementation of those ideas (Tang & Konde, 2020). Innovation is defined as something new to the social context in which it is introduced, even if it is not new to the individuals or group introducing it (Van Zyl et al., 2021). Innovation is based on an idea, which is a necessary but insufficient condition for innovation, to produce some form of benefit - financial, personal development, increased satisfaction, improved cohesiveness, or enhanced interpersonal communication (Kanike, 2023). Information and

Communication Technology (ICT) is recognized as a "web-based technology" that enhances the density, quality, and quantity of knowledge (Ferreira, 2021; Qin et al., 2021). ICT serves as the most crucial tool for supporting the intention of knowledge sharing, functioning as a platform that encompasses digital broadcast and telecommunications technologies, computer hardware and software, online and offline digital information repositories, and modern social networking features for online file-sharing systems (Harunavamwe & Ward, 2022; Rahiem, 2020). These technologies facilitate various processes associated with knowledge sharing (Seo et al., 2022).

Within organizations, ICTs are utilized alongside traditional tools like databases, e-mail, teleconferencing, intranets, and group decision support systems (Kanike, 2023). Additionally, more recent interactive social media platforms such as microblogging, wikis, blogs, online communities, and social networking sites are integrated. From an organizational perspective, an employee's work is often complex, involving multiple subprocesses, particularly within large, multi-level enterprises like manufacturing firms. Workers engage in information search, collaboration on shared processes, and the assimilation of knowledge, all while utilizing various technologies to meet job requirements. Given the complexity of tasks and the availability of multiple ICT tools, deeper research into media multiplicity is necessary to understand how ICTs can be used in conjunction to support communication and knowledge-sharing needs (Wen et al., 2021; Zhang & Wang, 2021). Prior studies have demonstrated that integrating various ICT technologies facilitates knowledge sharing and communication in organizational contexts (Kwon & Kim, 2020; Lukes & Stephan, 2017; Zhang & Wang, 2021). For organizations in the ICT sector, optimizing the innovative potential of their workforce is increasingly critical to maintaining or gaining a competitive edge (Ibrahim et al., 2020). Innovative behaviors directly impacting organizational performance are anticipated to be essential within the ICT sector (Önhon, 2019; Van Zyl et al., 2021). Innovation behavior refers to the actions and efforts of employees focused on introducing, creating, and implementing concepts, products, methods, or procedures that are novel and intended to provide significant benefits to the adopting unit (Kwon & Kim, 2020; Malibari & Bajaba, 2022; Wen et al., 2021).

H4: Intention to use ICT significantly impacts innovative behavior.

Personnel within organizations assess technostress generators individually due to differing expectations from both external and internal sources (Tang & Konde, 2020). Employees evaluate disruptive events based on their perceived level of control over the situation (Ibrahim et al., 2020; Nastjuk et al., 2024). When workers possess the ability and resources to manage stressors, they perceive these challenges as opportunities for professional growth. Conversely, stressors are perceived as threats when employees feel ill-equipped to handle them, potentially leading to diminished work performance (Kuadey et al., 2024; La Torre et al., 2020; Merdan & Karadal, 2022; Rahiem, 2020) Rahiem, 2020).

Technostress manifests in several forms, with techno-overload being a primary source. This occurs when ICT forces employees to manage an excessive workload under tight deadlines and high pressure (Jurek et al., 2021). Adjusting to new technologies can also result in techno-overload, as employees modify their work habits to accommodate these changes (Aristizabal & Rasmussen-Moseid, 2020; Ferreira, 2021). In such scenarios, employees may feel threatened due to a perceived lack of control in their work environment, exacerbated by an increasing volume of emails and technology-driven interactions (Gemeda & Lee, 2020; Ibrahim et al., 2020). As control over work diminishes, employees' coping mechanisms, such as confidence and self-efficacy, erode, leading to stress from the growing workload. Research consistently shows that prolonged exposure to stressors can cause even well-trained individuals to deviate from optimal performance (Harunavamwe & Ward, 2022; Nastjuk et al., 2024). Additionally, fatigue results from depleting resources under sustained and demanding workloads, significantly impacting performance even on simple tasks (Upadhyaya & Vrinda, 2021; Wong et al., 2022; Zhao et al., 2020).

The literature distinguishes between challenge stressors - pressures related to learning and task completion, perceived as opportunities - and hindrance stressors—obstacles that prevent goal

achievement, perceived as threats. Employees feel positively challenged when they have the resources and control to manage the situation (Valta et al., 2024). Conversely, those who perceive a loss of control and inadequate coping mechanisms feel threatened. Based on the control theory of occupational stress, a linear relationship is proposed between each technostress generator and ICT-enabled employee innovation (Ferreira, 2021). Organizations, driven by the need to outpace competitors, respond swiftly to customer demands, and increase profits, have intensified their use of technology. This heavy reliance on technology can lead to stress, impairing employee performance and service quality. Technostress arises from factors such as the inability to adapt to rapid technological advancements, the complexity and change encountered, information overload, and unclear authority and responsibilities (Qin et al., 2021). Employees face increased workloads, system issues, and the complex, fast-changing nature of ICT, leading to extended work hours and the subsequent experience of technostress (Malibari & Bajaba, 2022; Van Zyl et al., 2021; Zhang & Wang, 2021).

H5: Perceived technostress significantly moderates the relationship between intention to use ICT and innovative behavior.

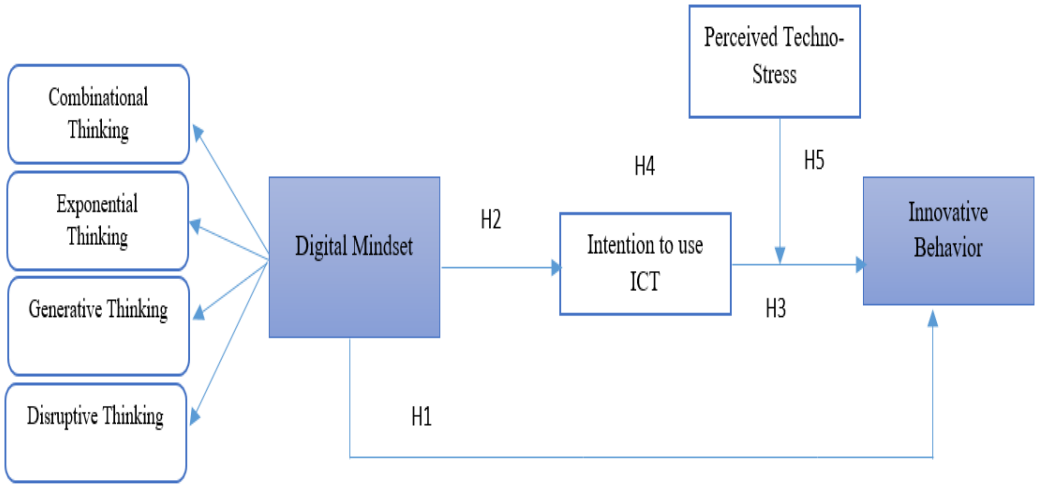

Figure 1: Conceptual Framework

3. Methodology

This study employed a survey approach to collect data through a primary data collection method. Respondents were approached directly to gather responses. Data collection was conducted ethically, with 400 questionnaires distributed among IT professionals working in software houses in Pakistan. Of these, 320 respondents provided usable data, resulting in an 80% response rate, sufficient for testing the study's hypotheses. The unknown population size and the inability to access comprehensive data from the software houses necessitated the use of a non-probability sampling technique. Convenience sampling was employed, with the understanding that not all respondents would participate in all three data collection phases. This research is quantitative and descriptive in nature, as the data collected was numerical. Smart PLS was used for data analysis, and all required tests were conducted to draw conclusions based on the collected data and results.

3.1. Instrument

The study's instrument was a questionnaire, developed using an adapted approach where items for each variable were sourced from relevant studies, considering the nature and context of the research. All items were based on a 5-point Likert scale, with "5" representing "strongly agree" and "1" representing "strongly disagree." Reliability analysis was conducted to ensure the reliability of the

adapted items. The questionnaire included a section explaining the study's purpose and instructions for responding, along with demographic questions presented as close-ended options to facilitate ease of response. The instrument was divided into three parts according to the time horizon of data collection. The predictor variable, digital mindset, comprised of four dimensions: combinational thinking (measured by 1 items from (Valta et al., 2024), exponential thinking (measured by 2 items from (Valta et al., 2024), generative thinking (measured by 3 items from (Valta et al., 2024), and disruptive thinking (measured by 4 items from (Valta et al., 2024). The intention to use ICT, the mediator variable, was measured using 5 items from the scale of (Önhon, 2019). The moderating variable, perceived technostress, was measured using 6 items adapted from the scale developed by Chandra et al. (2019). The outcome variable, innovative behavior, was measured using 7 items from (Lukes & Stephan, 2017). Each respondent was informed about the purpose of the study and assured that their participation was voluntary. Ethical considerations were emphasized throughout the data collection process, including ensuring the confidentiality of the provided information. The participants were cooperative, as reflected by the high response rate, and their contributions were crucial in gathering the necessary data for this research.

3.2. Demographics

Table 1 below presents the sample's demographic information and descriptive statistics (N=320). The analysis considered various demographic factors such as age, gender, experience, and designation of IT professionals employed in software houses in Pakistan.

Table 1: Demographic profile

Demography	**Description**	**No. of Responses %**
Gender	Male	69%
	Female	31%
Age	25-35	34%
	35-44	38%
	Above 45	28%
Qualification	Undergraduate	33%
	Post-graduate	36%
	IT diploma	31%
Experience	Less than 2 Years	32%
	3-6 Years	38%
	More than 6 Years	30%
Designation	Traditional Employees	27%
	Part-Time Freelancers	32%
	Full-Time Freelancers	41%

4. Analysis and Discussion

4.1. Assessment of Measurement Model

All items exhibit loadings greater than the recommended threshold of 0.40. The Average Variance Extracted (AVE) for each construct surpasses the advised value of 0.40, explaining over half of the variance observed in the items, with AVE values ranging from 0.518 to 0.800. Composite Reliability (CR) values range from 0.766 to 0.900, exceeding the satisfactory cutoff values of 0.6 and 0.9, indicating a robust measurement model (Hair et al., 2019).

Table 2: Reliability and Validity

Construct	CA	CR	AVE
Digital Mindset	0.914	0.926	0.576
Combinational Thinking	0.838	0.892	0.675
Exponential Thinking	0.849	0.898	0.689
Disruptive Thinking	0.755	0.860	0.672
Generative Thinking	0.707	0.838	0.634
Intention to use ICT	0.892	0.921	0.701
Perceived Technostress	0.926	0.938	0.629
Innovative Behavior	0.888	0.911	0.564

Using the Fornell-Larcker criterion, (Fornell & Larcker, 1981) the square root of the AVE for each construct is higher than the correlations of the constructs with other constructs, confirming discriminant validity. Additionally, the Heterotrait-Monotrait (HTMT) ratio of correlations is below the 0.85 thresholds, further establishing the discriminant validity of the measurement model.

Table 3: Discriminant validity

	CT	DM	DT	ET	GT	ICT	IB	PTS
Combinational Thinking	0.822							
Digital Mindset	0.880	0.690						
Disruptive Thinking	0.659	0.867	0.830					
Exponential Thinking	0.580	0.813	0.628	0.820				
Generative Thinking	0.667	0.791	0.517	0.598	0.796			
Intention to use ICT	0.636	0.773	0.752	0.639	0.524	0.837		
Innovative Behavior	0.720	0.879	0.878	0.692	0.607	0.808	0.751	
Perceived Technostress	-0.651	-0.730	-0.677	-0.586	-0.494	-0.782	-0.720	0.793

4.2. Assessment of Structural Model

In the second phase, a bootstrapping method with a sample size of n = 5,000 was employed to validate the structural model. The R^2 index for the variables indicated predictability levels surpassing the required threshold (Hair et al., 2019). We analysed the strength and significance of the path coefficients to assess the structural model and establish the relationships between constructs. Additionally, the coefficient of determination (R^2 value) was calculated using the PLS-SEM method to reflect the model's predictive accuracy.

Table 4: Assessment of R-Square

	R-Square
Intention to use ICT	0.598
Innovative Behavior	0.814

The standardized beta (β) was used to illustrate variables' differences and assess the hypotheses' significance. The research model (Table 5) provided the standardized beta values for each relationship, indicating the importance of endogenous latent variables. The beta values were tested for significance using t-statistics, with bootstrapping employed to validate the connections and confirm the significance of the beta values. Table 5 displays each hypothesis's path coefficients, t-statistics, and p-values. The subsequent section presents the direct and indirect implications of the research model.

Table 5: Results

	Relationships	β values	P Values	Decision
H1	**Digital Mindset -> Innovative Behavior**	0.623	0.000	Supported
H2	**Digital Mindset -> Intention to use ICT**	0.773	0.000	Supported
H3	**Digital Mindset -> Intention to use ICT -> Innovative Behavior**	0.236	0.000	Supported
H4	**Intention to use ICT -> Innovative Behavior**	0.305	0.000	Supported
H5	Moderating Effect 1 -> Innovative Behavior	0.078	0.008	Supported

The findings indicate that hypothesis 1, which posits that a digital mindset (combinational, exponential, generative, and disruptive thinking) significantly influences innovative behavior, is supported. The results align with the contextual drivers of individual employee innovative behavior and emphasize the importance of contextual factors in innovation outputs (Forsythe & Rafoth, 2022). Through its components, a digital mindset impacts how supportive managers and leaders are towards innovative behavior among their staff (Karatepe et al., 2020). Hypothesis 2, which proposes that a digital mindset significantly influences the intention to use ICT, is also supported. Employees with a strong digital mindset may be more efficient in problem-solving, which could reduce the perceived difficulty of using digital technology (Tang & Konde, 2020). This relationship is supported by research suggesting that effective problem-solving enhances performance, potentially filtering out negative influences such as those that might discourage innovative behavior (Ata & Khan, 2023; Khalil & Taj, 2021). Furthermore, the findings indicate that the impact of perceived technological stress on employee behavior diminishes as the digital mindset strengthens. Employees facing technological stress might consider leaving the challenging situation, potentially even quitting the organization. Hypothesis 3, which suggests a significant mediating effect of ICT use intention between digital mindset and innovative behavior, is also supported. Employees with a strong digital mindset may better manage innovative activities, consistent with studies linking positive perceptions of digital technology at work with reduced negative impacts on innovative behavior (Su et al., 2020; Wong et al., 2022). The study explores how a fixed digital mindset might relate to training programs when influenced by the intention to use ICT, possibly affecting perceived usefulness and, in turn, technological approach.

Hypothesis 4, which posits that the intention to use ICT significantly impacts innovative behavior, is supported. The intention to use ICT industry's rapid advancements and high turnover rates were considered, revealing a positive relationship between job engagement and innovative work behavior (Harunavamwe & Ward, 2022; Wang et al., 2021). The results suggest that while intention to use ICT usage might not always be the primary mode of communication within an organization, it still correlates positively with innovative work behavior. Hypothesis 5, which explores the moderating effect of perceived technostress on the relationship between ICT use intention and innovative behavior, is supported, as shown in figure 2. The study found that perceived technostressors reduce innovative activity using digital technologies, such as intention to use ICT (Zhao et al., 2020). However, high levels of intention to use ICT and related thinking methods may encourage employees to tackle challenging tasks, thus reducing the negative impact of technostressors on innovative behavior (Wen et

al., 2021).

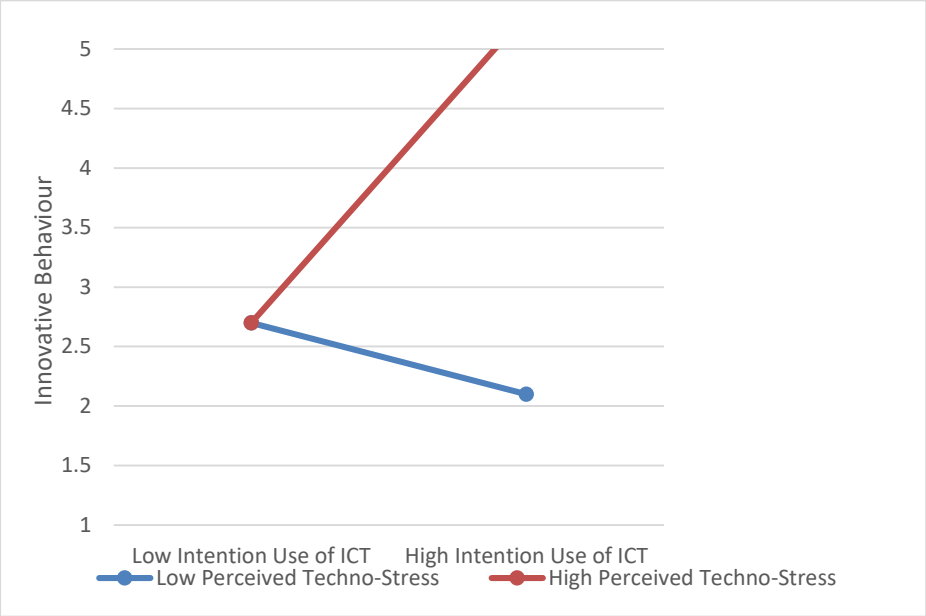

Figure 2: Moderating Role of Perceived Technostress

5. Conclusion

This study enhances our understanding of the innovative behavior of employees in IT firms and the contextual factors that contribute to developing a digital mindset. Employees with a strong digital mindset are better equipped to tackle the complex and uncertain challenges posed by digital technologies and can devise novel solutions more rapidly. The findings underscore the digital mindset as a unique and dynamic characteristic within IT that can mitigate the adverse effects of technological stressors, increase the intention to use ICT, and promote innovation. The research offers valuable insights for professionals aiming to cultivate a digital mindset among staff and promote a positive work environment in the digital era. Understanding innovative behaviors and the factors that support innovation can help managers and practitioners build on strengths, address weaknesses, and manage innovation more effectively. The study's results indicate that the goals of the organizations and individuals involved in the research align regarding effective software development. By carefully managing these variables, software development can be conducted efficiently, with the adaptability of the staff contributing to the production of high-quality software.

5.1. Implications of the Study

This research presents significant theoretical and practical implications. The findings suggest that a person's core values, such as intention to use ICT, can influence their interaction with technology. It is essential to encourage innovation within businesses, considering the substantial evidence that an innovative climate can promote innovative behavior (Qin et al., 2021). Top management, which typically sets the stage for innovative practices, should minimise risks, especially as technostress has been shown to impair performance (Harunavamwe & Ward, 2022). Limiting the use of ICT at work or establishing boundaries to reduce harm could be an effective way for organizations to prevent technostress. Therefore, when assessing technology, it is crucial to consider its utility and perceptions of its technological attributes. Practitioners should recognize that employees have diverse attitudes, and new workplace technologies should account for these differences. This study applied a simplified interpretation of the initial concept of a digital mindset, modified to include technostress. Although this approach incorporated relevant thought patterns, future research could explore additional patterns with

different moderating and direct effects. Prior studies have shown that attitudes can generally promote innovative behavior in employees (Ferreira, 2021). Therefore, future research could focus on identifying which digital mindset patterns most significantly impact innovative behavior in companies. This line of inquiry might provide valuable insights into how perceptions change in response to different thought processes. Further research could examine how specific thought patterns influence the mental filter through which individuals perceive technostressors by mapping these patterns onto various technostressors.

5.2. Limitations and Future Research

This study opens several avenues for future research. First, while focusing on professionals working in software houses in Pakistan, using samples representative of the population, future studies should explore the application of innovative practices and intention to use ICT in European contexts. Additionally, most of our data were self-reported, which could introduce bias. However, in Study 2, we used objective data to validate the findings, and the comparison of mean differences between workers and entrepreneurs further supports the validity of innovative behavior. Future research could incorporate measures such as supervisor evaluations of innovative conduct. The sample size and distribution also pose limitations. Although the sample is representative in terms of age and gender, the demographic variation is insufficient to explore the underlying causes of the outcomes thoroughly. A more robust analysis would be possible with a larger sample. Future studies could increase respondent numbers by sending direct mail to all employees. Finally, it is essential to identify, measure, and assess additional potential mediating mechanisms that could indirectly influence innovative behavior. These factors could further enhance our understanding of the outcomes. Despite these limitations, the rising number of people who intend to use ICT and the growing investment by businesses in their employees' intention to use ICT suggests that this area of study will continue to be highly relevant.

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Measurement Scale

Variables	Items	Sources
	Digital Mindset	
1.Combinational Thinking	1. I often think about how IT can be combined in a way similar to a modular IT 2. I enjoy recombining IT from existing components of a variety of technology fields to create new things 3. I always notice that digital products consist of different (digital) components 4. I always think about combining different IT when solving problems	(Valta et al., 2024)
2.Exponential Thinking	1. I am aware of the high growth potential of IT 2. I always think of the future growth of IT as an exponential curve 3. I always have the long-term exponential growth projections of IT in mind	(Valta et al., 2024)
3.Generative Thinking	1. When using IT, I always think about what else I could use it for besides its intended functions 2. I always see potential new use cases for IT that go beyond the intended use 0.810 I enjoy developing or using IT that is generic and versatile 3. If I developed IT, I would always provide possibilities for alternative use cases	(Valta et al., 2024)
4.Disruptive Thinking	1. I always see potential for digital products or services to transform entire markets 2. I always recognize how IT could replace established solutions 3. I always see potentials for existing business models being replaced by disruptive IT 4. I regularly think about how the business model of my company/employer could be replaced by a more effective unexpected IT	(Valta et al., 2024)
5.Intention to use ICT	1. ICT provides possibilities for enhancing the quality of learning 2. For me, it is important that my future students will use ICT in their learning 3. I look forward to the use of ICT in my work as a teacher	(Önhon, 2019)
6.Perceived Technostress	1. I am forced by IT to work with very tight time schedules 2. I have a higher workload because of increased IT complexity 3. I am forced by IT to work much faster 4. I spend less time with my family due to IT	(Chandra et al., 2019)
7.Innovative Behavior	1. I try new ways of doing things at work 2. I prefer work that requires original thinking 3. When something does not function well at work, I try to find new solution 4. I try to get new ideas from colleagues or business partners	(Lukes & Stephan, 2017)