INNOVATION WORK BEHAVIOR IN THE DIGITAL ERA: A SYSTEMATIC LITERATURE REVIEW

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Abstract- The digital era has transformed organizational dynamics, necessitating innovative work behavior (IWB) as a key driver of competitive advantage. This study systematically reviews the role of technology and organizational culture in shaping IWB, focusing on their interplay and implications for organizations. The objective is to understand how technological advancements influence IWB and how aspects of organizational culture can enhance or inhibit this behavior in the digital era. Despite the growing emphasis on IWB, there is limited understanding of how technology and organizational culture jointly influence it, creating gaps in both theory and practice. This paper integrates insights from diverse studies to highlight the synergy between technology and organizational culture, proposing that their interplay is pivotal for fostering IWB. A systematic review approach was employed, synthesizing findings from peer-reviewed articles, reports, and case studies to identify trends, relationships, and critical gaps. The findings reveal that technology facilitates IWB by enabling collaboration, real time decision-making, and innovative problem-solving. However, its potential is moderated by organizational culture factors such as leadership support, openness to change, and psychological safety significantly enhance or constrain IWB. The study identifies the need for a balanced approach that aligns technological capabilities with cultural readiness. This review underscores the interdependence of technology and organizational culture in fostering IWB and highlights critical gaps and future research opportunities. Addressing these gaps can guide organizations in effectively leveraging technology and culture to sustain innovation in the digital era.

Keywords: Innovation Work Behavior; Digital Era; Organizational Culture; Systematic Literature Review

1. INTRODUCTION

In the fast-evolving landscape of the digital era, innovation has become the lifeblood of organizational success. Organizations worldwide are increasingly recognizing the importance of fostering innovative work behavior (IWB) among employees to sustain competitiveness and respond to rapid technological advancements. IWB defined as the generation, promotion, and implementation of innovative ideas at the workplace is critical for addressing complex

organizational challenges and seizing emerging opportunities. The digital transformation sweeping across industries underscores the urgency of understanding how various factors, particularly technology and organizational culture influence IWB.

Research indicates that an innovative organizational culture significantly enhances IWB as it encourages employee autonomy and creativity (Pham & Le, 2023; Shanker et al., 2017; ÖZDAŞLI et al., 2023). Research has shown that leadership, especially transformational and ethical leadership positively influences IWB by fostering supportive environments that empower employees (Li et al., 2020; Choi et al., 2016). Additionally, employee engagement and resilience are critical factors that correlate with higher levels of IWB, suggesting that organizations should cultivate an engaging work atmosphere to stimulate innovation (Baety & Rojuaniah, 2022; Iqbal et al., 2023). The interplay between organizational culture, leadership, and employee engagement forms a robust framework for promoting IWB in the face of ongoing digital transformation.

The interplay between digital tools and organizational culture is crucial for fostering an environment conducive to innovation. Technological advancements, such as artificial intelligence and digital communication platforms can enhance organizational performance, but their effectiveness is contingent upon a supportive culture that encourages creativity and collaboration (Aboramadan, 2022; Schuldt & Gomes, 2020). Research shows that an organization's culture plays a big role in the link between adopting new technology and innovation. This means that companies with a culture that values innovation are more likely to use technology tools effectively (Donate & Guadamillas, 2010; Uzkurt et al., 2013). Conversely, a resistant culture can inhibit innovation, regardless of the sophistication of the technology employed (Nkonge, 2018; Imran et al., 2022). For instance, studies show that organizations with strong cultural support for innovation tend to outperform their counterparts in adopting and implementing new technologies (Uzkurt et al., 2013;Imran et al., 2022). Thus, cultivating an organizational culture that embraces change and innovation is essential for maximizing the benefits of digital tools in today's rapidly evolving landscape.

This review addresses a critical research gap by systematically examining existing literature on this intersection. The review focuses on a significant gap in the existing body of knowledge: the limited research examining the intersection of technological enablers and cultural factors in driving IWB. Several studies have highlighted the importance of organizational culture in fostering IWB among employees. For instance, Eskiler et al. (2016) found that a supportive organizational culture, where supervisors are likely to support innovative behaviors, is crucial for enhancing IWB. Similarly, Bysted (2013) emphasized that an innovative culture characterized by freedom, autonomy, and a customer-centric orientation can enable employees to be more innovative. Additionally, Kraśnicka et al. (2018) demonstrated that a pro-innovation organizational culture can mediate the relationship between management innovation and enterprise performance.

While there is substantial literature exploring how technology (e.g., digital tools, platforms, or AI) or organizational culture (e.g., leadership style, openness to innovation) individually influence IWB (Solée et al., 2013) very few studies delve into how these two forces interact and synergize to shape innovative behaviors in organizational settings (Wagner et al., 2016). By systematically analyzing this intersection, the review contributes to a more holistic understanding of the dual role played by technology and culture (Parolin et al., 2020; Chen et al., 2022). This is particularly important in the digital era, where technological adoption and cultural adaptability often work in tandem to drive creativity, problem-solving, and innovation (Koivula et al., 2023).

Unlike prior studies that adopt a narrow focus, either emphasizing technological advancements (e.g., how digital tools enhance employee collaboration) or cultural dynamics (e.g., the role of trust and empowerment in innovation), this work provides a comprehensive analysis (Sanmas et al., 2023; Yunita et al., 2023; Zhen & Ding, 2024; Öngel et al., 2023). It goes beyond these isolated perspectives to uncover how technology and culture interact as interconnected systems (Sanmas et al., 2023; Yunita et al., 2023; Zhen & Ding, 2024; Ulukan, 2020). For instance, advanced technologies might influence organizational culture by fostering transparency, collaboration, or a risk-taking mindset, or a supportive and adaptive culture can maximize the benefits of technological tools by encouraging employees to experiment and innovate (Yunita et al., 2023; Zhen & Ding, 2024; Ulukan, 2020; Öngel et al., 2023).

The novelty of this work lies in its interdisciplinary approach and the synthesis of knowledge across diverse fields such as organizational behavior, technology management, and innovation studies. It draws insights from multiple disciplines to build a richer understanding of IWB (Büschgens et al., 2013; Zafar & Mehmood, 2019; Middleton et al., 2019). This integration is particularly valuable because the challenges of fostering IWB in the digital era cannot be fully understood through a single lens (Hooi & Chan, 2023). Moreover, the review does not stop at theoretical insights, but it proposes actionable frameworks for research and practice (Mcdonald et al., 2018). These frameworks aim to guide both academics and practitioners in identifying key factors that influence IWB from both technological and cultural perspectives (Hooi & Chan, 2023), designing interventions that simultaneously address technological and cultural needs to foster innovation in the workplace (Angeloni, 2013), and offering practical solutions for leaders and organizations looking to improve their innovation capabilities in a technology-driven world (Botelho, 2020).

The objective of this article is to provide a systematic synthesis of existing knowledge on the role of technology and organizational culture in fostering IWB, identifying key trends, gaps, and future research directions. This effort is guided by the following research questions:

RQ1: How do technological advancements, such as digital tools and platforms, directly influence innovation work behavior (IWB) in organizational settings?

RQ2: What specific aspects of organizational culture (e.g., leadership style, openness to change, collaboration) mediate the relationship between technology adoption and IWB?

RQ3: How do technology and organizational culture interact to enhance or inhibit IWB in the digital era?

RQ4: How do individual factors, such as digital literacy or employee attitudes, influence the effectiveness of technology and culture in promoting IWB?

RQ5: What cultural and technological barriers exist in organizations that prevent employees from fully engaging in IWB?

RQ6: How does the role of technology and organizational culture in shaping IWB vary across industries, organizational sizes, or geographic regions?

2. RESEARCH METHODOLOGY

The systematic literature review approach is thought to be the most suitable for this study. This review specifically addresses how organisational culture dynamics and technology developments interact, as well as how these factors together affect organisational outcomes (Bayhan & Korkmaz, 2021). It also offers scholars and practitioners an integrative framework of current knowledge (Srirahayu et al., 2023). In doing so, researchers used a domain-based strategy and adhered to the recommendations made by Vrontis et al. (2021), Christofi et al. (2021), and Paul & Criado (2020).

A systematic literature review (SLR) was chosen as the methodological foundation due to its ability to enhance the rigor and quality of the research (Moher et al., 2015). Researchers searched for articles from 2000 to 2024. Unlike traditional reviews that may lack structure, an SLR follows a clearly defined process that ensures the review is transparent (Macharia, 2022). By documenting the steps taken such as the criteria including or excluding studies, the review becomes easy to understand and evaluate (Ourzik, 2022). This transparency strengthens the reliability of the findings. Furthermore, the review is reproducible. A systematic procedure enables other researchers to replicate the process under similar conditions, verifying or extending the findings. Additionally, the review is comprehensive. SLRs systematically cover a wide range of studies to capture the breadth of existing knowledge, reducing the risk of bias or oversight.

The SLR methodology enabled the researchers to undertake three critical activities (Anurahman et al., 2023). By Critical analysis, the researchers to evaluate the existing body of research to assess how technology and organizational culture have been studied in relation to IWB (Hartnell et al., 2011; Mete, 2017). This includes identifying strengths, limitations, and gaps in the current literature (Boell & Cecez-Kecmanovic, 2015). By synthesis of knowledge, the researchers to combine insights from diverse studies to offer a cohesive understanding of the role technology and organizational culture play (Kamel & Aref, 2017; Setyawasih & Hamidah, n.d.).. This synthesis helps bridge fragmented research, creating a unified perspective on the topic (Frangieh & Yaacoub, 2017). By mapping of broad themes, the researchers to categorize the existing research into major themes, such as how technology serves as an enabler of IWB (Anurahman et al., 2023; Wang et al., 2010).

2.1 Selecting Article Process

The search string for scientific database searches is set by the review question, which drives the systematic literature review (S. H. Xiao & Nicholson, 2013). The review question for this paper is: How do technological advancements, such as digital tools and platforms, directly influence innovation work behavior (IWB) in organizational settings? What specific aspects of organizational culture (e.g., leadership style, openness to change, and collaboration) mediate the relationship between technology adoption and IWB? How do technology and organizational cultures interact to enhance or inhibit IWB in the digital era? How do individual factors, such as digital literacy or employee attitudes, influence the effectiveness of technology and culture in promoting IWB? What cultural and technological barriers exist in organizations that prevent employees from fully engaging with IWB? How does the role of technology and organizational culture in shaping IWB vary across industries, organization sizes, or geographic regions?

The researchers explored the online databases Sciencedirect and EBSCO after coming across previous recent systematic reviews (e.g., Hewett et al., 2018; Nadeem et al., 2018). Therefore, the researchers used Marler & Boudreau (2017) and Sheehan et al. (2010) as a search strategy for IWB, organisational culture, and technological advancements. The researchers also followed a systematic review that was focused on inovvative work behaviour research in order to capture all relevant articles (Bos-Nehles et al., 2017). The following keyword search algorithm was created and used as a result: ("Technology" OR "advanced technology" OR "artificial intelligence" OR "smart device" OR "Internet of Things" OR "digital transformation" OR "organisational culture" OR "innovation culture" OR "innovation work behaviour culture" OR "innovation work behaviour" OR "innovation behaviour").

The researchers searched titles, keywords, and/or abstracts using this combination of terms, as is commonly done by systematic literature reviews (Crossan & Apaydin, 2010; Pisani

et al., 2017). 12,480 articles from the target databases made up our initial sample of potentially pertinent studies. There were 175 journal articles left after we eliminated studies that had nothing to do with our study questions after examining titles and abstracts. 49 of the remaining articles passed the screening process after we checked their full texts for eligibility in relation to the established inclusion criteria. As a result, 49 articles in all were included for data analysis. The most pertinent study is from 2024, and the oldest study in our systematic literature evaluation was published in 2000. The selection procedure for the papers that were part of the review is depicted in Figure 1.
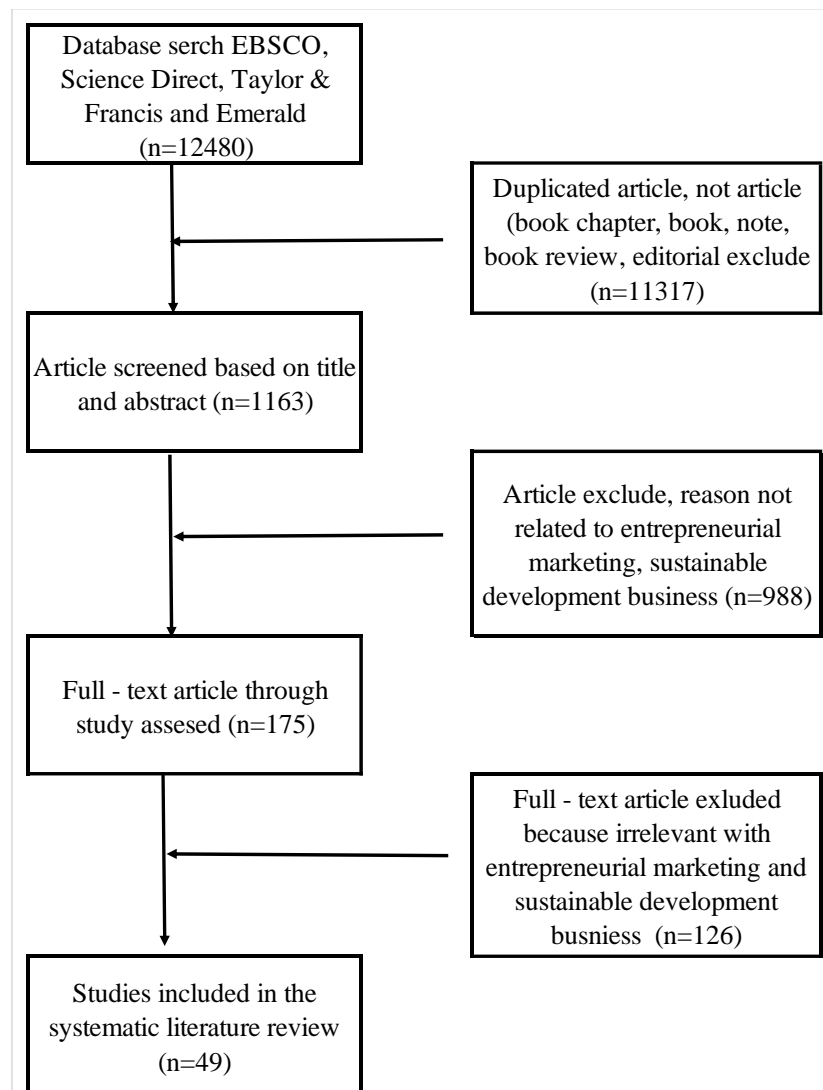

Figure 1. Selecting Articles Process Included in the Review.

2.2 Coding

Every article that was thought to be pertinent to this investigation was downloaded. After screening each publication, the researcher included pertinent information to a data extraction form (Andersén, 2017). This is done in accordance with Tranfield et al. (2003) in order to eliminate person mistake and document the process for reasons of reproducibility and transparency. The coded data were entered into an Excel spreadsheet and categorised according to the goals of our systematic review. These categories included publication details, the type

of paper (empirical, conceptual, or review), definitions that were pertinent to our research questions, the unit of analysis, the effects of advanced technology and organizational culture on innovation work behavior, key findings, and future research directions provided by the author or authors of each study.

Table 1. List of Authors, Years, Publisher of Journal

Authors (years)	Publisher of Journal	Type of Paper	Unit Analysis	Findings
de Rojas et al. (2024).	Telecommunica-tions Policy	Review	Regions and countries	Country or a region offers a different behavior relationship between digitalization and innovation.
Al Daboub et al. (2024)	International Journal of Innovation Studies	Empirical	ICT organizations	Psychological empowerment significantly enhanced innovative work behavior
Wyland et al. (2024)	Journal of Management Education	Empirical	Students	Participation in the Structure-Culture Alignment Activity improves know-ledge pertaining to diversity value attitudes towards aligning organizati-onal structural with DEI cultural.
Masrianto et al. (2024)	International Journal of Technology	Empirical	Employee of television stations	Digital transformation significantly mediate the relationship between innovation ecosystem readiness and digital marketing capability.
Sangaji & Pribadi (2023)	Quality-Access to Success	Empirical	Leaders and subordinates/ workers	Innovative work behavior and organizational learning capacity in bridging between flexible human resources and company innovation.
Omrani et al. (2022)	IEEE transactions on engineering management	Empirical	European Union and non-European Union SMEs	The technology context (IT infra-structure and digital tools) along with the existing level of innovation are the main drivers that act as stepping stones in digital technology adoption.
Cetindamar et al. (2021)	IEEE transactions on engineering management	Empirical	Australian employees' technology	TPB framework by introducing digital literacy as a perceived behavior control variable that helps to examine the role of employees in digital transformation.
Sjachriatin et al. (2023).	Uncertain Supply Chain Management	Empirical	MSMEs in East Java	Digital Transformation, and Human Resource Development significantly positively affected Innovative Behavior, Organizational Innovation.
Al Derei & Fam (2023)	Quality-Access to Success	Conceptual	SMEs	The impact of business intelligence, knowledge sharing and SMEs innova-tion on innovative work behavior to improve their performance.
Setyowati & Wida Riptanti (2023)	Agricultural and Resource Economics: International Scientific E-Journal,	Empirical	agribusiness MSMEs in Sukoharjo Regency	Organizational culture, market orienta-tion, and attitudes influenced the intention to innovate. The intention to innovate, in turn, had a significant effect on innovative behavior, as shown in the performance of agribusiness firms.
Abualigah et al. (2023).	Quality-Access to Success	Empirical	Container shipping and shipping lines company	The positive and significant effects of TQM practices and ERP system to enhance innovative work behavior.The mediation role of innovation culture

Authors (years)	Publisher of Journal	Type of Paper	Unit Analysis	Findings
				between TQM practices and ERP system and innovative work behavior.
Ramiah & Moore (2023).	Emerald Emerging Markets Case Studies	Empirical	Postgraduate- and master's-level students	Students should be able to identify the reasons why the company needed to digitise and how this links to the company's strategy around technology and innovation.
Y. Xiao et al. (2023)	Journal of Global Information Management	Empirical	Organization members	Dissonant tie promotes organizational innovation performance and are enhanced by digital sensing and digital seizing.
Malekpour et al. (2023)	International Journal of Emerging Markets,	Empirical	Customers	The effect of digital transformation in the retail industry will be more apparent in an emerging market.
Lawande (2023)	Australasian Accounting, Business and Finance Journal	Empirical	Knowledge workers from an ITES firm	Characteristics depicted by construct-ive nonconformists tend to showcase innovative work behavior. If a constructive nonconformist is allowed to thrive in any work environment, then the goal of innovative work behavior can definitely be achieved.
de Paula et al. (2023)	Industry and innovation	Conceptual	Practitioners and educators	The paper contributes to the body of knowledge by identifying and prioritising specific behavioural strategies to form a novel set of survival conditions aligned to the new industrial paradigm of Industry 4.0.
Schepers et al. (2022)	Journal of Product Innovation Management	Empirical	External technology experts	Manufacturers increasingly involve external technology experts (ETEs) from suppliers in collaborative R&D projects. Through their innovative work behavior (IWB), these temporary employees help to creatively solve manufacturers' engineering problems.
Senbeto et al. (2022).	Journal of Hospitality & Tourism Research	Empirical	Hotel employees and managers	Employee openness positively mediates innovative and collaborative cultures' relationships on employee innovation behavior.
Gharieb (2022).	Tehnički glasnik	Empirical	Administrators in the various administrative university	Sharing knowledge increases product-ivity within the university, supports innovation among administrators, helps develop university work procedures, and increases the efficiency of employee's cooperation.
Andersen et al. (2022)	Creativity and Innovation Management	Empirical	SMEs	Critical Business Model Innovation process activities: (1) assessing the environment in new opportunities, (2) conveying a sense of urgency, (3) exploring and testing new opportuni-ties and (4) handling decision-making with a combination intuition and data.
Galpin (2022)	Journal of Business Strategy	Conceptual	C-Suite executives	Eighty-six percent of respondents identified innovation is a strategic priority for their firm, while just 8% of

Authors (years)	Publisher of Journal	Type of Paper	Unit Analysis	Findings
				respondents rated their companies as having a "high" level of firm-wide innovation.
Вороненко et al. (2022)	Financial and credit activity problems of theory and practice	Review	Ukraine	The basis of Ukrainian innovative competitiveness is the development of institutions, infrastructure and business. These areas need special state support, effective implementation is the main competitive advantage.
Galiulina & Touate (2022)	European Project Management Journal	Conceptual	Innovation project members	Certain aspects of national culture influence partners' behaviour in open innovation projects within innovation clusters, and what dimensions of the organisational culture of the members involved in these projects should be modified to match better with an open innovation paradigm.
Centobelli et al. (2022).	International Journal of Entrepreneurial Behavior & Research	Empirical	Italian firms	Four startup behaviors for adopting digital technologies: digital follower, technical influencer, social influencer and digital leader.
Frehn et al. (2022)	Health care management review	Empirical	Physician practice	Efforts to expand social risk screening among system-owned physician practices should focus on supporting practice capabilities, including enhancing health information technology, promoting an innovative organizational culture, and advancing patient engagement strategies.
Schütz & Strohmaier (2022).	Economics of Innovation and New Technology	Review	EU member states	Future innovation policy needs to prioritise a more cohesive and egalitarian European knowledge base in this strategic technology field and cope with the current imbalances in the distribution of power.
Kensbock & Stöckmann (2021).	Journal of Business Economics	Empirical	Employees working in industries	Digital transformation triggers emplo-yees to engage in an intrinsically motivated process during which they adopt a learning orientation, which consequently motivates them to express voice behavior.
Gonzalez-Varona et al., (2024).	ArXiv preprint arXiv	Review and in deph interview	Academics and professionals	Model of organizational competence for digital transformation allows SMEs to identify and develop the digital capabilities necessary to advance in the digital transformation
Schuldt & Gomes (2020)	Gestão & Produção	Empirical	Textile industry	Processes and Internal relationship of the innovation group as present in the environment conducive to the development of innovations.
Santoso et al. (2019).	International Journal of Technology	Empirical	Managerial-level and above employees	There was a significant and positive relationship between transformational leadership and innovative work behavior, innovative work behavior was

Authors (years)	Publisher of Journal	Type of Paper	Unit Analysis	Findings
				also significantly and positively related to performance, and digital literacy significantly moderated the relationship between innovative work behavior and performance.
Santoso & Furinto (2019)	International Journal of Recent Technology and Engineering	Empirical	Employee of technology based companies	Two determinants of innovative work behavior that help us to understand how self-efficacy and employee friendly workplace can evolve to facilitate job satisfaction outcomes
Santoso, Elidjen, et al. (2019).	Management Science Letters	Empirical	Managerial level and above of telco companies	There was a positive and significant relationship between creative self-efficacy, transformational leadership and innovative work behavior, innovative work behavior was positively related to performance, digital literacy gave significant moderating influences on the relationship between innovative work behavior and performance.
Rizki et al. (2019).	International Journal of Economics and Business Administration	Empirical	Employees of PT Bank Danamon Indonesia	A company's culture is significantly affected by innovation behaviour and innovation behaviour also has a significant effect on employee performance in PT Bank Danamon Indonesia.

Based on Table 1, researchers explain that document summarizes various research articles focusing on innovation, digital transformation, organizational culture, and related behaviors across diverse fields. Digital transformation involves integrating digital technology into all areas of an organization, fundamentally changing how it operates and delivers value to its stakeholders. From the analysis of the summarized articles, Omrani et al. (2022) underscore the importance of IT infrastructure and digital tools as critical enablers. These act as stepping stones, especially for small and medium enterprises (SMEs), to adopt advanced technologies. Masrianto et al. (2024) reveal that readiness within the innovation ecosystem significantly mediates the relationship between organizational preparedness and digital marketing capabilities. Digital transformation can enhanced operations due to automation and streamlined workflows. Additionally, digital transformation also can improved user experiences and engagement, especially evident in the retail industry (Malekpour et al., 2023). Ramiah & Moore (2023) highlight how digitalization links directly to company strategies around innovation. Howerver, the challenges of digital transformation are lack of digital literacy (Cetindamar et al., 2021), and resistance to change within organizations due to cultural inertia.

In additionally, innovative work behavior (IWB) refers to the actions taken by employees to introduce, apply, or implement new ideas, processes, or products within their work settings. From the analysis of the summarized articles, Al Daboub et al. (2024) identify psychological empowerment as a significant enhancer of IWB. Studies like Santoso et al. (2019) show that transformational leadership positively influences IWB by fostering creative environments. Employees with higher self-confidence in their abilities and constructive nonconformity thrive in innovative environments (Lawande, 2023). Digital transformation complements IWB by providing tools and platforms that facilitate creativity and collaboration. Xiao et al. (2023) emphasize the role of "digital sensing" and "digital seizing" in enhancing organizational

innovation performance. IWB can boost in organizational innovation capabilities. Moreover, IWB improved performance metrics, as seen in industries like agribusiness (Setyowati & Wida Riptanti, 2023). However, IWB have several barriers, such as lack of organizational support for new ideas, and insufficient training and resources to implement innovations effectively.

Additionally, organizational culture plays a foundational role in shaping how innovation and transformation are perceived and implemented within companies. From the analysis of the summarized articles, Sangadji & Islami (2024) note that innovative work behavior acts as a bridge between flexible human resources and organizational innovation, highlighting the importance of adaptive cultures. Gharieb (2022) emphasizes the role of knowledge-sharing practices in fostering collaborative and innovative cultures. Setyowati & Wida Riptanti (2023) identify that attitudes toward innovation and market orientation significantly influence the intent to innovate. Cultural types supporting innovation are innovative culture, collaborative culture, and learning culture. Innovative culture promotes experimentation and risk-taking. Collaborative culture encourages teamwork and open communication. Learning culture adapts rapidly to changing external environments by embracing continuous learning.

Interplay between digital transformation and IWB can explain that a supportive culture ensures that employees are motivated and equipped to adopt digital tools and engage in innovative behavior. Abualigah et al. (2023) show that a culture fostering innovation mediates the relationship between total quality management (TQM), ERP systems, and IWB. Organizational readiness and strategic focus drive both transformation and employee innovation (Schütz & Strohmaier, 2022). Furthermore, digital transformation, IWB, and organizational culture are interconnected. A robust organizational culture acts as the foundation for successfully adopting digital transformation, which in turn empowers employees to exhibit innovative work behavior. Organizations that strategically align their cultural values with digital tools and leadership development are more likely to thrive in a rapidly evolving business landscape.

3. THEMATIC ANALYSIS
3.1. Technological advancements and innovation work behavior (IWB)

Technological advancements, such as digital tools and platforms, have a significant influence on innovation work behavior (IWB) in organizational settings. The integration of digital technologies into the innovation process is crucial for building organizational capabilities and achieving operational fit between the new technology and existing business systems (Fakhruddin & Novani, 2023). Additionally, digital platforms enable organizations to execute innovative activities and achieve their objectives through frugal innovation (Nassani et al., 2022; Khattak, 2022). Furthermore, they provide organizations with valuable information and allow them to align their products and services strategically with their core activities, thereby facilitating innovation (Khattak, 2022).

Digital platforms are an emerging research area that enhances a firm's capacity to identify opportunities and achieve efficiency, competitiveness, and innovativeness (Sarwar et al., 2024). They enable organizations to engage in collaborative innovation in products and services by promoting connections and synergy among different elements in the digital innovation ecosystem (Li et al., 2022). Digital platforms also support the digital transformation of organizations, enabling them to combine their existing traditional business models with new digital business environments and facilitate business model transformation and digital innovation (Deng et al., 2022).

The adoption of digital platforms can enable platform-related capabilities as a key competitive advantage for digital transformation and innovation (Liu et al., 2023), and can also

influence the innovative work behavior of employees by enhancing their harmonious innovative passion, which is mediated by the integration of organizational and employee objectives and moderated by organizational culture (Ding et al., 2023). Additionally, digital literacy can play a moderating role in the relationship between innovative work behavior and employee performance (Santoso et al., 2019).

3.2. Organizational culture, technology adoption, and IWB

Technological advancements, such as digital tools and platforms can significantly influence innovative work behavior (IWB) in organizational settings with various aspects of organizational culture playing a mediating role in this relationship. One key aspect of organizational culture that can mediate the relationship between technology adoption and IWB is leadership style. Transformational and authentic leadership styles have been found to positively influence IWB with organizational culture serving as a mediator (Rashwan & Ghaly, 2022; Khan et al., 2020; Indrayanti & Ulfia, 2022). Transformational leaders who encourage creativity, intellectual stimulation, and employee empowerment can foster a culture that supports and promotes innovative behaviors (Khan et al., 2020; Ferdinan & Lindawati, 2021). Similarly, authentic leaders who demonstrate transparency, ethical decision-making, and a focus on employee development can create a culture of trust and openness, which in turn enhances IWB (Indrayanti & Ulfia, 2022).

Another important aspect of organizational culture is the level of openness to change and adaptability. Organizations with a culture that embraces change, encourages risk-taking, and supports experimentation are more likely to foster IWB (Puryantini et al., 2018). Digital platforms and technologies can enable and facilitate this type of innovative culture, as they provide employees with the tools and resources to explore new ideas and solutions (Puryantini et al., 2018).

3.3. Technology and organizational culture interact to enhance IWB in the digital era

The interaction between technology and organizational culture is crucial in enhancing or inhibiting innovative work behavior (IWB) in the digital era. Transformational and authentic leadership styles have been found to positively influence IWB, with organizational culture serving as a mediator (Rashwan & Ghaly, 2022; Khan et al., 2020; Indrayanti & Ulfia, 2022). Transformational leaders who encourage creativity, intellectual stimulation, and employee empowerment can foster a culture that supports and promotes innovative behaviors (Khan et al., 2020; Ferdinan & Lindawati, 2021). Similarly, authentic leaders who demonstrate transparency, ethical decision-making, and a focus on employee development can create a culture of trust and openness, which in turn enhances IWB (Indrayanti & Ulfia, 2022).

Organizations with a culture that embraces change, encourages risk-taking, and supports experimentation are more likely to foster IWB (Puryantini et al., 2018). Digital platforms and technologies can enable and facilitate this type of innovative culture, as they provide employees with the tools and resources to explore new ideas and solutions (Puryantini et al., 2018).

3.4. Digital literacy, technology and culture in promoting IWB

The interaction between individual factors, such as digital literacy and employee attitudes, and the effectiveness of technology and organizational culture in promoting innovative work behavior (IWB) is crucial in the digital era. Digital literacy defined as the ability to effectively use digital technologies, and plays a significant role in mediating the relationship between technology adoption and IWB (Cetindamar et al., 2021; Tatminingsih, 2022; Lund et al., 2019). Employees with higher digital literacy are better equipped to leverage

digital tools and platforms, which can enhance their innovative capabilities and behaviors (Alasiri & AlKubaisy, 2022). Digital literacy can also influence the way employees perceive and interact with the organizational culture, further impacting IWB (Schmitz et al., 2014).

Additionally, employee attitudes, such as openness to change, risk-taking, and commitment to innovation, can also mediate the effectiveness of technology and organizational culture in promoting IWB (Sangaji & Pribadi, 2023; Nabhan, 2021). Employees with a positive attitude towards technology and a willingness to experiment and learn are more likely to engage in innovative behaviors, especially when the organizational culture supports and encourages such behaviors (Aprilia et al., 2023; Statti & Torres, 2020). Furthermore, The alignment between individual and organizational objectives is another important factor that can influence the effectiveness of technology and organizational culture in promoting IWB (Yuan et al., 2019; Setyawan et al., 2022). When employees perceive a strong alignment between their personal goals and the organization's innovation agenda, they are more likely to engage in IWB, particularly when supported by the appropriate digital tools and a culture that fosters innovation (Lund et al., 2019). Moreover, an employee's self-efficacy, or belief in their own capabilities, and the sense of psychological safety within the organization can also mediate the relationship between technology, organizational culture, and IWB (Gupta et al., 2019; Agarwal & Lenka, 2018). Employees who feel confident in their abilities and secure in their work environment are more likely to take risks, experiment, and engage in innovative behaviors, especially when supported by the right digital tools and a culture that encourages such behaviors.

3.5. Cultural and technological barriers that prevent employees from fully engaging in IWB

Based on the provided references, several key cultural and technological barriers exist in organizations that can prevent employees from fully engaging in innovative work behavior (IWB). Organizations with a culture that is resistant to change, does not encourage risk-taking, and lacks support for experimentation can hinder the development of IWB (Bayhan & Korkmaz, 2021; Schuldt & Gomes, 2020). Additionally, Organizations that do not have a culture that values innovation, creativity, and the sharing of new ideas can inhibit employees from engaging in IWB (Eskiler et al., 2016; Stoffers et al., 2015). Furthermore, transformational and supportive leadership styles that empower employees and encourage innovative behaviors are crucial, but their absence can be a barrier to IWB (Choi et al., 2016; (Li et al., 2019).

In additionally, employees with low digital literacy skills may struggle to effectively utilize digital tools and platforms, hindering their ability to engage in IWB (Cetindamar et al., 2021; Tatminingsih, 2022; Alasiri & AlKubaisy, 2022). Organizations with outdated or incompatible digital technologies and platforms can create barriers to the efficient use of digital tools, limiting the potential for IWB (Sangaji & Pribadi, 2023). Employees who are resistant to adopting new digital technologies and tools can be less inclined to engage in IWB, as they may not fully leverage the capabilities of these technologies (Gupta et al., 2019; Agarwal & Lenka, 2018).

3.6. Role of technology and organizational culture in shaping IWB (Industries, organizational sizes, or geographic regions)

The role of technology and organizational culture in shaping innovative work behavior (IWB) can vary across different industries, organizational sizes, and geographic regions. Based on industries, In the logistics industry, an innovative organizational culture that nurtures behaviors encouraging innovation is crucial for fostering IWB (Bayhan & Korkmaz, 2021). In

the manufacturing industry, organizational culture and employee engagement play a significant role in promoting IWB. In the healthcare sector, the organizational culture of nursing care workers is an important factor in influencing their innovative behaviors (Kim, 2021). In the education sector, transformational leadership and organizational culture have a significant impact on the IWB of lecturers and teachers (Mastur et al., 2022; Ferdinan & Lindawati, 2021).

Based on organizational size, for small and medium-sized enterprises (SMEs), digital platforms and a green organizational culture can enable and promote green innovative behaviors (Siswanti & Muafi, 2022). Larger organizations may face challenges in sustaining a culture of entrepreneurship and innovation, which can impact IWB (Hughes et al., 2018). Furthermore, based on geographic, studies from different countries, such as Turkey (ÖZDAŞLI et al., 2023), Indonesia (Indrayanti & Ulfia, 2022), and South Korea (Jia et al., 2018), have highlighted the importance of the interplay between organizational culture and leadership in shaping IWB.

4. FRAMEWORK DEVELOPMENT

Figure 2 framework development, which explains the integration relationship between the variables of technological advancements, organisational culture, technology adoption, employee engagement, digital literacy, and innovative work behaviour, is derived from the synthesis of the findings discussed in the thematic analysis section. Its multifaceted nature is revealed through thematic analysis. As a result, creating a more precise, in-depth framework that is pertinent to the subject of innovative work behaviour is essential. Innovative work behaviour encompasses activities like idea generation, idea promotion, and idea realization. Each of the direct effects builds a foundation for employees to engage in these behaviours by providing tools (technological advancements), a conducive environment (organizational culture), and the means to implement innovation (technology adoption).
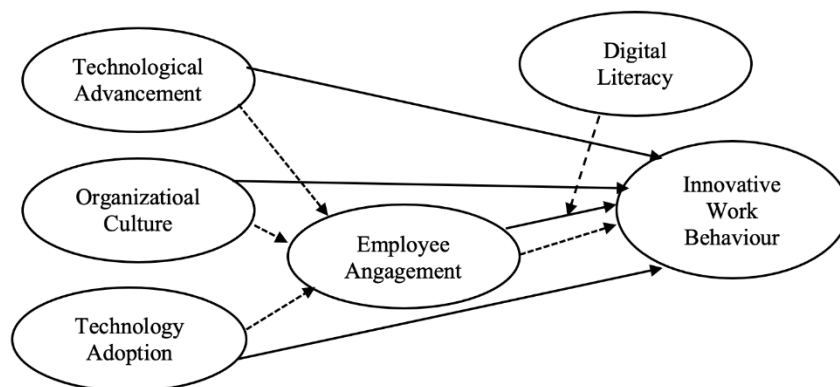

Figure 2. Framework Development

In direct effect, technological advancements provide employees with tools, systems, and processes that enhance their efficiency and creativity. Access to advanced technology enables employees to experiment, solve problems, and develop innovative solutions. As a result, technological advancements significantly influence innovative work behaviour. In addition, a supportive organizational culture encourages creativity, risk-taking, and collaboration among employees. Cultures that value openness, learning, and innovation foster an environment where employees feel motivated to explore new ideas and implement them. As a result, organisational culture significantly influences innovative work behaviour. Furthermore, technology adoption reflects an organisation's ability to integrate technology into daily operations. When employees

effectively use technology, they can streamline processes, identify opportunities for improvement, and implement innovative practices. As a result, the adoption of technology significantly influences innovative work behavior.

It is an elaboration of the indirect effects of the independent variables (Technological Advancements, Organizational Culture, Technology Adoption) on the dependent variable (Innovative Work Behaviour) through the mediator (Employee Engagement) and with the moderator (Digital Literacy). Employee engagement acts as a bridge between the independent variables (technological advancements, organizational culture, technology adoption) and innovative work behaviour. Digital literacy amplifies the positive impact of employee engagement on innovative work behaviour, creating a synergistic effect.

Technological advancements can increase employee engagement by providing modern tools, automation, and resources that reduce mundane tasks and boost job satisfaction. Engaged employees are more likely to be motivated to exhibit innovative behaviours. As a results, employee engagement mediates the relationship between technological advancements and innovative work behaviour. In additional, a positive organizational culture enhances employee engagement by fostering inclusiveness, collaboration, and a sense of purpose. Engaged employees in a supportive culture are more likely to feel empowered to generate and implement new ideas. As a reults, employee engagement mediates the relationship between organizational culture and innovative work behaviour. Additionally, effective technology adoption increases employee engagement by making tasks more efficient, reducing frustrations associated with outdated processes, and fostering a sense of accomplishment. Engaged employees tend to leverage adopted technologies to innovate. As a results, employee engagement mediates the relationship between technology adoption and innovative work behaviour.

Furthermore, digital literacy strengthens the link between employee engagement and innovative work behaviour. Employees with high digital literacy are better equipped to leverage their engagement by using technology creatively and effectively, enhancing their capacity to innovate. As a results, digital literacy moderates the relationship between employee engagement and innovative work behaviour, such that the relationship is stronger for employees with higher levels of digital literacy. Moreover, the indirect effects of the independent variables on innovative work behaviour (via employee engagement) may be contingent on the level of digital literacy. Employees with high digital literacy can amplify the mediating effect of employee engagement. As a results, the mediated relationships between the independent variables (technological advancements, organizational culture, technology adoption) and innovative work behaviour through employee engagement are moderated by digital literacy.

5. CONCLUSION

Technological advancements, such as digital tools and platforms, have a significant influence on innovative work behavior (IWB) in organizational settings. The integration of digital technologies into the innovation process is crucial for building organizational capabilities and achieving operational fit between the new technology and existing business systems (Fakhruddin & Novani, 2023). Digital platforms enable organizations to execute innovative activities and achieve their objectives through frugal innovation (Nassani et al., 2022, providing valuable information and allowing them to align their products and services strategically with their core activities, thereby facilitating innovation (Khattak, 2022).

Various aspects of organizational culture play a mediating role in the relationship between technology adoption and IWB. Transformational and authentic leadership styles that encourage creativity, intellectual stimulation, and employee empowerment can foster a culture

that supports and promotes innovative behaviors (Rashwan & Ghaly, 2022; Khan et al., 2020). Organizations with a culture that embraces change, encourages risk-taking, and supports experimentation are more likely to foster IWB (Puryantini et al., 2018). Additonally, the interaction between technology and organizational culture is crucial in enhancing or inhibiting IWB in the digital era. Cultural barriers, such as organizational cultures resistant to change, lack of innovative culture, hierarchical structures, and lack of leadership support, can hinder the development of IWB (Bayhan & Korkmaz, 2021). Technological barriers, including lack of digital literacy, incompatible digital infrastructure, resistance to technology adoption, and lack of digital transformation strategy, can also prevent employees from fully engaging in IWB (Cetindamar et al., 2021).

Individual factors, such as digital literacy and employee attitudes, can also influence the effectiveness of technology and culture in promoting IWB. Employees with higher digital literacy are better equipped to leverage digital tools and platforms, which can enhance their innovative capabilities and behaviors (Lund et al., 2019). Employee attitudes, such as openness to change, risk-taking, and commitment to innovation, can also mediate the effectiveness of technology and organizational culture in promoting IWB (Statti & Torres, 2020).

This study contributes to the existing literature by providing a comprehensive understanding of the complex interplay between technology, organizational culture, and innovative work behavior. It highlights the mediating role of various aspects of organizational culture, the barriers that can inhibit IWB, and the influence of individual factors. The findings also suggest the importance of considering contextual factors, such as industry, organizational size, and geographic region, in shaping the relationship between technology, culture, and IWB. Additionally, for practitioners, this study offers valuable insights for fostering a culture that supports and encourages innovative behaviors. Organizations should focus on developing transformational and authentic leadership styles, creating an environment that embraces change and risk-taking, and promoting collaboration and knowledge sharing. Addressing the technological barriers, such as improving digital literacy and aligning digital infrastructure with the organization's innovation strategy, is also crucial. By understanding the contextual factors that influence the relationship between technology, culture, and IWB, organizations can tailor their strategies to the specific needs of their industry, size, and geographic region.

6. LIMITATION

Based on the review of the provided references, several critical gaps and future research opportunities in the field of technology, organizational culture, and innovative work behavior (IWB) can be identified. While the literature has focused on the positive influence of innovation climate on IWB, there is a need to examine the potential negative impacts of innovation climate as well (Newman et al., 2020). This could provide a more nuanced understanding of the role of organizational climate in shaping IWB. In additional, the existing research has primarily taken a static view of innovation climate. Future studies should explore how innovation climate develops and changes over time, and how this dynamic process influences IWB (Newman et al., 2019). Futhermore, the existing literature has largely focused on organizational-level factors, but there is a need to examine the influence of cultural and institutional factors on the development of innovation climate and its impact on IWB (Newman et al., 2020).

Additionally, while many studies have identified various antecedents of IWB, such as psychological empowerment, organizational justice, and knowledge sharing, there is a need to further explore the underlying mechanisms and mediating processes that explain how these factors influence IWB (Liu et al., 2023; Park & Kim, 2022). Furthermore, the existing literature has primarily focused on organizational-level factors, but there is a need to examine how

individual factors, such as digital literacy, employee attitudes, and personal innovativeness, moderate the relationship between technology, organizational culture, and IWB (Cetindamar et al., 2021; (Alasiri & AlKubaisy, 2022).

7. ACKNOWLEDGMENT

We would like to thank each and every author for their invaluable contributions to this study. This article did not receive any outside support. Regarding this study, the authors disclose no conflicts of interest.

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