Digital Transformation on Firm Business Performance: Mediating Roles of Digital Innovation and Digital Competencies

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Abstract

Current research explores the impact of digital transformation on firm business performance in small and medium enterprises (SMEs). To investigate the digital transformation, have a significant relationship with a firm's business performance, digital innovation, and digital competencies. The study employed a descriptive research design, utilizing scales to measure digital transformation, digital innovation, digital competencies, and firm business performance. We collected the data using convenience sampling. The target organization conducted a survey with 536 employees from 25 different work units, utilizing PLS-SEM for data analysis and path analysis. Results indicated that digital transformation contributes to firm business performance. The study significantly contributes to Pakistan's economic growth, demonstrating how digital transformation influences SME performance and provides insights for policymakers and managers on fostering digital competencies to drive innovation and growth in the SME sector. This suggests that SMEs should strategically align their digital initiatives with digital innovation and digital competencies to maximize performance outcomes. Additionally, the findings indicate that SMEs management must actively engage in creating and capturing value through digital innovation practices, which can help mitigate the risks associated with employee resistance and inertia during the transformation process. Future research could explore competitive differences across various industries or countries to validate the

results and examine whether non-innovative SMEs experience similar benefits from digital transformation.

Keywords: Digital transformation, digital innovation, digital competencies, firm business performance.

1. Introduction

Digital transformation entails the utilization of digital technologies to modify company processes, organizational culture, and customer experiences. Digital transformation can enhance the performance of an organization by enhancing efficiency, decreasing expenses, and fostering creativity. Nonetheless, several experts argue that digital transformation is unlikely to consistently exhibit a direct positive association with organizational success. As the global economy matures and competition intensifies, adopting cutting-edge technologies becomes essential for enhancing performance. These businesses, which are vital for job creation and economic growth, struggle with digital transformation due to constraints in financial resources, personnel, and skills. However, learning to utilize new tools can unlock opportunities for growth and resilience in a fast-paced environment. Currently, SMEs are unable to fully implement digital marketing strategies because of these limitations. Most research on digital marketing focuses on large firms, leaving a gap in understanding its impact on SME performance. Digitization denotes the transformation of analog information into digital representations. Although it offers cost reductions, its influence on value creation endeavors is constrained. Conversely, digitalization (Ritter and Pedersen, 2020) entails the adoption and application of digital technology to enhance corporate processes and augment consumer value, presenting increased opportunities for value generation. Digital transformation refers to a complete change that impacts the entire company and has important strategic ramifications for organizations, especially for creative small and medium-sized businesses (Verhoef et al., 2021). The advent of cutting-edge digital technologies, such as big data analytics, the Internet of Things, and artificial intelligence, has significantly changed business operations and market competitive dynamics. For businesses looking to improve their digital transformation efforts, these tools are crucial (Oduro et al., 2023; Sair et al., 2023). Digital transformation refers to a complete change that impacts the entire company and has important strategic ramifications for organizations, especially for creative small and medium-sized businesses (Verhoef et al., 2021). The advent of cutting-edge digital technologies, such as big data analytics, the Internet of Things, and artificial intelligence, has significantly changed business operations and market competitive dynamics (Clarysse et al., 2022; Ali, & Khan, 2024). For businesses looking to improve their digital transformation efforts, these tools are crucial (Sawers et al., 2008; Khan et al., 2023). Enterprise has many different reasons to involve in the organization transformation. The first reason is to focus on the core competency. Digital Transformation is the process through which organizations use digital technology to enhance their core business operations, thereby radically altering how organizations operate and give value to consumers (Fitzgerald et al., 2014; ali et al., 2024). Development in information technology creates new opportunities for the long-term survival of the business in the marketplace (Ali et al., 2024). This research more about how digital transformation affects digital innovation and digital competencies. This helps us understand what drives digital innovation and digital competencies in innovative small businesses. It also helps us understand how digital

innovation and digital competencies can help innovative small businesses turn digital transformation into performance. Ultimately, by concentrating on SMEs, we provide novel theoretical insights while acknowledging the necessity to abandon a uniform approach to such enterprises. This study provides both theoretical and empirical insights, while also raising crucial questions to stimulate further research on digital transformation, digital innovation, and digital skills within SMEs.

1.1 Problem statement

This gap study contributes to the body of knowledge on business model innovation and digital transformation in small and medium-sized businesses from a variety of angles. We give academics new perspectives on how digital transformation affects body mass index, improving understanding of BMI factors in the context of innovative small and medium-sized businesses. This study provides theoretical and empirical insights and raises critical questions to stimulate further research on digital transformation and business model innovation in small and medium-sized firms. Limited research investigates the enduring impacts of digital transformation on organizational performance or the manner in which digital innovation and capacities develop to mitigate these consequences. Digital innovation and digital capabilities are recognized as business performance drivers, but little is known about how they interact and reinforce each other in digital transformation. Most studies analyze how digital transformation affects corporate performance, but few examine how digital innovation and competences mediate this relationship. Most current research focuses on major firms or certain industries while the influence of digital transformation on SMEs, or less digitally developed industries, is understudied.

The research investigates the positive and significant link between digital transformation and a firm's business performance, along with its positive and significant association with digital innovation. This research develop a model to analyses the relationship between small and medium-sized enterprises and digital transformation, highlighting the significant and positive correlation with digital competences, as well as the connection between digital innovation and company performance. The relationship between digital transformation and digital competencies is both positive and substantial. The considerable impact on digital transformation is favourably and strongly correlated with digital competencies.

1.2 Research questions

- Does digital transformation have a positive and significant relationship with a firm's business performance and digital innovation?
- Does digital transformation have a positive and significant impact on digital competencies and firm business performance.

2. Literature review

2.1 Digital transformation

The term digital Transformation is one of the most prevalent perspectives among consultants, managers, and researchers from the past few years. Digitization and digitalization are two terms that are closely associated, but both have different concepts. Digitization is the automation of already established manual and paper-based work processes from analogue

artefacts to digital format. Digitalization has a broader concept refers to the use of digital technologies to develop the new business process to create customer value (Berghaus, 2018; Gobble, 2018; Hafeez et al., 2023). Consequently, the digital transformation relates to digitalization, where organization transformation is introduced by technological advances. In SMEs literature, the concept of organizational Transformation with IT-enabled transformation is focused on the digital transformation of any SMEs organization. The matrix quadrant consists of Quick-run Organization, Innovative Transformer, Learning Organization and Dynamic Transformer along with three dimensions; Mode of IT use, Mode of Change and Complementarities among SMEs and organizational resources. This metric demonstrates the different set of conditions and characteristics at different levels for SMEs organizational transformation. Contemporary marketing employs artificial intelligence and data analytics, hence enhancing collaboration in digital marketing and emphasizing that digital transformation reengineers businesses (Liu et al., 2021; Sair et al., 2023; Ali et al., 2024).

2.2 Supporting theory

This qualitative research project will not involve testing the idea or contributing to theory development. In the domain of Information Systems, certain theories offer phenomenological support for the concept of digital organizational transformation, including the Theory of Enterprise Transformation (Rouse, 2005), Diffusion of Innovation (Rogers, 1962; 2003; Ali et al., 2024), and An Emerging Theory of Enterprise Transformations (Kotnour, 2014). In conducting case studies, we examine the theoretical frameworks that underpin transformational occurrences inside the business. Diverse organizational needs propel entities toward transformation. Theoretical backing for the fundamental concept of change may differ between organizations. The following theories are elaborated upon below. The theory of enterprise transformation provides The theory of enterprise transformation examines the reasons and mechanisms behind transformation, as well as the methods employed in relation to work processes and their architectural frameworks. Rouse asserts that value shortfalls propel transformation activities inside firms. Deficiencies encompass the present organizational condition and the anticipated state. The state comprises a collection of variables that indicate the current position of the system and its future trajectory. The state assesses the present position and predicts the subsequent position. Organizational expectations may be contingent upon the existing role, expected market expansion potential, emerging technologies, and other factors (Rouse, 2005; Khan et al., 2024).

2.3 Hypotheses development

2.3.1 Digital transformation and firm business performance

Organizational processes and business activities can benefit from digital transformation (Karimi et al., 2015). This impact and its impact on performance may vary by firm. Some companies fail to fulfill their digital transformation targets (Schallmo et al., 2017; Vial, 2019). Digital transformation demands organizations to adopt methods and policies to compete in a fast-digitizing environment, which needs significant financial and skilled workforce investments (Gong and Ribiere, 2021). First, digital transformation lets companies implement data retrieval and processing methods. This allows organizations to use data to improve performance. By digitalizing everything within the organization, firms can improve

their digital agility to capitalize on new market trends (Volberda et al., 2021). Companies can improve operational and process efficiency via digital transformation. It permits cheaper shipping and better company information interchange, which should cut costs (Pagani, 2013) and make innovative SMEs more profitable (Frank et al., 2019). Digital transformation studies prioritize implementation plans. Few studies have studied how DT influences company performance. Researchers found that technology adoption in the financial industry directly improved business performance, suggesting that this benefit may remain longer due to its complexity. We found that digital transformation impacts operating performance more than financial performance. To improve operating performance, digital transformation demands stronger policy and innovation environments (Plekhanov et al., 2023). We used a resource-based viewpoint in textile SMEs and showed that DT improves organizational performance. Data shows that IT capabilities like e-commerce and social media boost corporate success (Mergel et al., 2019). Innovation boosts corporate performance, according to extensive research. Innovation can boost a firm's success regardless of its age or size (Depino-Besada et al., 2024). In a study of Australian manufacturing enterprises, a dynamic environment moderated the effect of product innovation on performance. However, competition boosts process innovation and moderates that effect. Innovations in products and processes boost corporate performance (Chen et al., 2016). Environmental volatility only boosts product and process innovations, not business performance. However, they studied UK hotel social media use. This study demonstrated that ICT adoption boosts creativity and performance independent of firm age or sector (Altamimi & Hilmi, 2023).Based on these arguments, we propose the following hypothesis.

H1: *Digital Transformation has a positive and significant relationship with Firm Business Performance.*

2.3.2 Digital transformation and digital innovation

DT is key to innovation. It drives digital innovation and can change a company's business strategy, both startups and established ones. Digital transformation is changing the business models of SMEs. A qualitative study on industrial businesses suggests that digital transformation can stimulate digital innovation by experimenting with value creation and delivery models and novel value capture methods. Although theoretical considerations imply a favorable link between digital transformation and digital innovation in SMEs, practical data is weak and scattered (Christofi et al., 2023; Ciacci et al., 2023). Digital transformation also lets firms seamlessly deliver new value propositions to customers. Today, firms can co-deliver value. Smaller, creative SMEs adapt and work with suppliers and partners more easily (Ulas, 2019). Digital transformation can help SMEs decouple or disintermediate their value chain to deliver value. These techniques balance authority, responsibility, and independence between value chain enterprises. Digital transformation lets SMEs shift distribution and sales channels (Ulas, 2019). By digitizing everything, SMEs can adopt an omnichannel approach, which can boost e-commerce and e-payments. Digital transformation can also help a corporation leverage new market niches or consumer segments. This helps SMEs capture more value by serving a market segment that larger enterprises miss (Ulas, 2019). However, enterprises risk being threatened if others take their value. Digital innovation is a good approach to develop and deliver value, but it doesn't guarantee value capture. This suggests organizations may

need to revamp their value capture business model. Small and medium businesses Customers' internal data could help SMEs build new revenue streams like data-based services for customers or external companies. Digital transformation also allows market segmentation and price customization, which boosts value capture. Thus, digital transformation could help innovative SMEs quickly recognize customer behavior trends and alter price to capture more value (Lanzolla et al., 2020). Consequently, we present the following hypothesis.
H2: *Digital transformation has a positive and significant relationship with digital innovation.*

2.3.3 Digital transformation and digital competencies

Digital currencies, in their diverse manifestations, are essential in a society where digital evolution and awareness are paramount. Various studies characterize digital competence (DC) as the abilities and knowledge necessary for engagement in the digital realm, encompassing proficient access to and utilization of online information. This pertains to the adoption and utilization of digital tools. This study enhances this concept by focusing on competencies outside ICT utilization. This perspective covers online presence and digital administration and communication. Research emphasizes the importance of these workplace competencies in managing digital tools, aligning with "adoption and use of digital tools." Labor market adaptation, linked to digital growth, is stressed (Barenfänger and Otto, 2015).
DT stresses digital business innovation skills from a corporate standpoint and team emphasize that home culture and parental mediation impact DT, especially media education and teen digital disparities. This connects DT to digital evolution or awareness. DT skills like interaction and online platform utilization are crucial for enterprises (Sassanelli et al., 2021). Digital transformation also lets companies effortlessly communicate their new value offerings to customers. Companies can now collaborate to create value. Creative, smaller SMEs are more flexible and work better with suppliers and partners. Decoupling or disintermediating their value chain can help SMEs use digital transformation (Sabaruddin et al., 2023). These strategies help value chain firms share power, responsibilities, and autonomy. Digital transformation lets SMEs change distribution and sales networks (Sorescu, 2017). By digitizing all possible parts, SMEs can implement an omnichannel strategy, boosting e-commerce and electronic payments. Digital transformation may also allow a company to target a new market or consumer group. Small and medium-sized firms profit because they may give value to a market segment larger multinationals ignore, increasing value capture. However, enterprises may be threatened if others take their value. Digital innovation creates and delivers value, but not more value capture. Value capture increases with market segmentation and pricing modifications enabled by digital transformation. Thus, digital transformation could enable innovative SMEs swiftly identify customer behavior patterns and adjust price to increase value (Lanzolla et al., 2020).
H3: *Digital Transformation has a positive and significant relationship with digital innovation.*

2.3.4 Digital innovation and firm business performance

Digital innovation is essential for adapting to external developments and staying ahead in company (Heider et al., 2021). Digital innovation is risky and time-consuming, which could have negative effects (Sabaruddin et al., 2023). SMEs may lack managerial skills and struggle to balance old and new business models when building new ones (Sabaruddin et al., 2023).

Despite the general threats to small and medium-sized enterprises (SMEs), innovative SMEs have unique characteristics that allow them to leverage their digital innovation efforts, making them more appealing to customers and improving their performance. Digital innovation can also improve new product development in SMEs. Digital innovation is essential for SMEs seeking international sales growth (Colovic, 2022). Digital innovation also lets SMEs use and adapt their resources in new ways, increasing profitability. Digital innovation can help firms cut inventory costs and improve operational efficiency by forming new ties with suppliers and business partners (Huang et al., 2013).

H4: *Digital innovation has a positive and significant relationship with firm business performance.*

2.3.5 Digital competencies and firm business performance

According to (Foss et al., 2018) assert that digital competencies are vital for gaining a competitive edge in the business landscape and for adjusting to external developments. A recent meta-analysis indicated a predominantly favorable correlation between digital capabilities and business performance, contingent upon firm- and context-specific attributes. According (Teece, 2010) asserts that attaining long-term success necessitates not only superior technology, products, and leadership but also the capacity to adapt the company model to the evolving competitive landscape. Small and medium-sized enterprises face specific constraints that may increase the probability of adverse results. Small and medium-sized enterprises may exhibit deficiencies in managerial capabilities and have challenges in developing new business models due to the intricacies of aligning traditional models with innovative ones. The adoption of new business models poses challenges for small and medium-sized enterprises, as it requires skilled personnel and specialized expertise, which may not be readily available to all (Verhagen et al., 2023). The enhancement of digital capabilities can aid small and medium-sized enterprises in refining product development, formulating new value propositions, and expanding sales in international markets, notwithstanding certain challenges. By employing this method, small and medium-sized enterprises can augment their profitability and raise their attractiveness to clients by allocating resources to burgeoning industries. Numerous research have established that digital competencies are essential for the advancement of small and medium-sized enterprises. A correlation exists between the formation of new connections and partnerships with diverse suppliers and business partners and the decrease in inventory costs and the improvement of operational efficiency in organizations. The cultivation of digital competencies is one method to achieve this objective (Zott and Amit, 2007; Huang et al., 2013).

H5: *Digital transformation has a positive and significant relationship with digital competencies.*

2.3.6 Digital transformation, digital innovation, and firm business performance

The business model bridges technology with strategic goals. Prior research has focused on the direct effects of digital innovation on organizational results, but few studies have examined its internal intermediary process. Small and medium-sized businesses recognize that digital transformation and innovation boost performance. Organizations must optimize digital innovation using a suitable business strategy to maximize digital transformation value

(Tsou et al., 2023). Thus, organizations must develop a business plan to maximize digital transformation profitability. This study builds on digital innovation literature to propose that digital innovation mediates the relationship between digital transformation and organizational performance. Digital innovation helps SMEs turn digital transformation efforts and costs into improved organizational performance. Despite hurdles, SMEs can use digital competencies to improve product development, create new value propositions, and boost foreign sales. This strategy allows SMEs to invest in new areas, increasing profits and customer appeal. Studies show that SMEs need digital skills to succeed. Digital skills can help organizations reduce inventory costs and boost operational efficiency by building new relationships with varied suppliers and business partners (Tsou et al., 2023). Digital innovation helps companies profit from digital transformation. It uncovers new business prospects and generates income. The successful implementation of new digital technologies requires this alignment. Second, a business model describes how to profit from digital technology investments. Digital innovation helps companies deliver and capture value from new product breakthroughs. Digital innovation can also improve digital transformation by improving external coordination and letting organizations distribute operations outside their bounds, which can boost profits. According to these theories, digital innovation mediates how digital transformation affects innovative SMEs' commercial performance (Guo et al., 2021). DT helps organizations deliver new value propositions to customers cost-effectively and continuously. DT may also assist a company exploit a new market niche or consumer segment. This is crucial for innovative SMEs because it lets them serve a tiny market segment that larger enterprises neglect, helping them capture more value (Latifi et al., 2021).

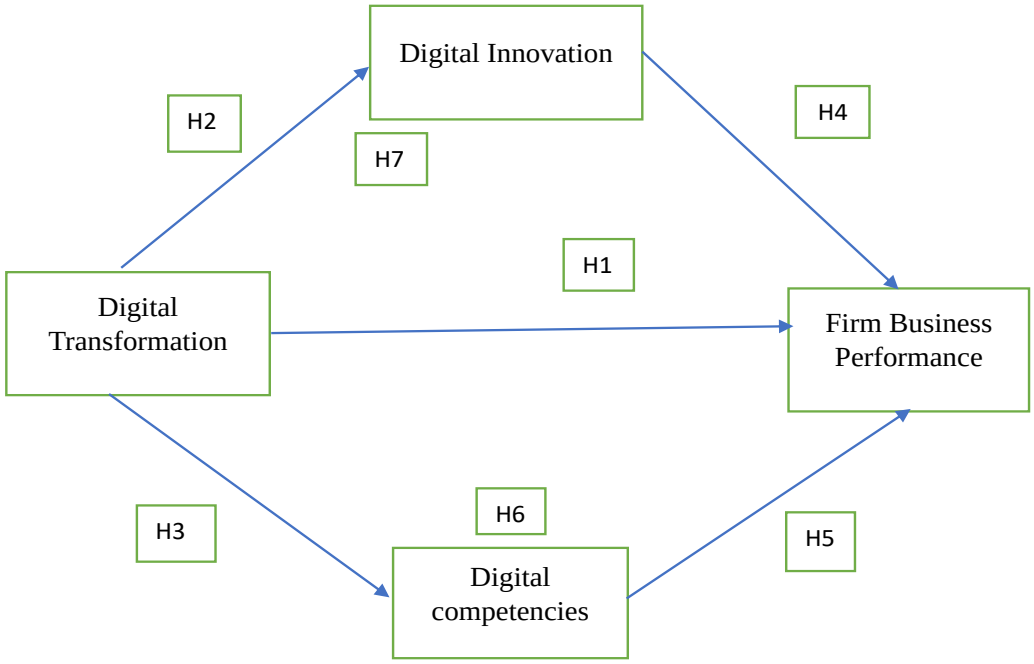
H6: *Digital transformation has a positive and significant relationship with digital competencies.*

2.3.7 Digital transformation, digital competencies and firm business performance

Digital transformation and digital capabilities can boost SMEs' performance, but supportive approaches are needed to optimize its value. Based on digital competence literature, this study proposes that digital competencies mediate digital transformation and firm business performance (Rozak et al., 2021). Digital competencies can help SMEs turn their digital transformation efforts and financial investments into improved corporate performance, and they can help companies leverage digital transformation by identifying new business opportunities and revenue sources. Business models integrate strategic processes with digital technology for deployment and value capture. Thus, it mediates SMEs' business performance (Teng et al., 2022). These cognitive gaps may lead to an industry unprepared for digital upheaval. Digital disruption (DT) causes firms to adjust their operations (Vial, 2019). Digital disruption in the research business is growing exponentially. Unable to respond to digital disruption results in missing out on game-changing DT opportunities. We'll elaborate on these prospects and give industry examples later. Addressing these understanding gaps is the subject of this study because they are crucial to the industry. We remedy gaps by analyzing managerial DT competencies and adding digital transformation and digital business competencies if needed (Buhalis et al., 2019). Although similar, skill and competency are different. According to (Johnson et al., 2008) defined competencies as complex bundles of acquired knowledge that employees utilize to coordinate activities and use assets during organizational processes and provided a list of digital positions created by DT or disruptive

technologies that match digital competencies (Boulton, 2018).
H7: *Digital transformation has a positive and significant relationship with digital competencies.*

2.7 Conceptual framework



3. Methodology

The design of the research, the gathering of data, the analysis of the outcomes, we carry out the research design, data gathering, outcome analysis, and interpretation using specific policies and methods. Examine the research design, demographic and sample size, study techniques, and data analysis methodology in this investigation. This research is quantitative, cross-sectional, and was done by a survey questionnaire. This study seeks to determine the effect of agile methodology on the relationship between digital transformation and organizational performance, emphasizing the mediating roles of digital innovation and digital capabilities. The requisite data for subsequent research and to generalize the results has been obtained from the Pakistani SME sector. This research employed a method referred to as convenience sampling for data collection (Sunder et al., 2012).

3.1 Population and sampling

The employees of small and medium-sized enterprises are the ones who provided the data for this study. The convenience sample technique was employed, ensuring full anonymity and voluntary participation. All SMEs operating in the above-mentioned directories were chosen as the population for this study. The smallest sample size computed for an unknown population size was 536, using a 95% confidence level and a 5% margin of error.

Respondents were chosen using a stratified convenient sampling approach because random sampling was not feasible due to list non-availability, accessibility concerns, and time constraints (Barreiro & Albandoz, 2001). To evaluate our proposed research hypotheses, we selected a sample of Pakistani SMEs from the SMEDA, Small Industries Corporation of Pakistan, and Chamber of Commerce directories. Small and medium-sized enterprises contribute significantly to Pakistan's economic growth (Flor and Oltra 2004; Alegre and Pasamar, 2018).

3.2 Scale and measures

A quantitative research design with a survey approach was used to investigate the links between digital transformation, digital innovation, digital competencies, and firm business performance. A structured questionnaire, designed in English Language, was used to collect data from SMEs since it was more efficient for gathering responses from SMEs and geographically dispersed group. The questionnaire included 36 statements on digital transformation (06), digital innovation (11), digital competencies (04), and firm business performance (15).

3.2.1 Digital transformation

Digital transformation, as articulated by Verhoef et al. (2021), is an organization-wide occurrence that entails the inventive application of digital technology and the strategic utilization of essential resources. Digital transformation seeks to enhance a company and reestablish its value proposition to stakeholders, leading to more profound strategic imperatives and heightened possibilities for transformation (Ritter and Pedersen, 2020). Digital transformation was assessed using a six-item scale (Ukko et al., 2019).

3.2.2 Digital innovation

As per (Coad et al., 2016) suggest that IT innovation is critical to enhancing a firm's performance regardless of its age or size. In contrast, a competitive setting reduces the effect while increasing process innovation (Prajogo, 2016). IT innovations improve firm business performance but do not attenuate the association between IT innovation and firm business performance (Turulja, 2019).

3.2.3 Digital competencies

The advancement of technologies facilitates the emergence of new activities and objectives, therefore the significance of digital competence is perpetually evolving and should be considered in relation to contemporary technology and its applications. Digital competencies were assessed using a four-item scale (Anders Skov, 2016).

3.2.4 Firm business performance

According to (Ferreras-Méndez et al., 2015) the performance of SMEs was assessed using a four-item scale, where participants evaluated their firm's performance relative to competitors on a five-point scale from 1 to 5. According to author (McDermott and Prajogo, 2012) assert that utilizing measurements of business performance serves as a valid proxy in SMEs.

3.3 Data analysis

In this research were used structural equation modeling (PLS-SEM) to assess the relationship among digital transformation, innovation, competencies, and organizational performance utilizing Smart PLS-14. Initially, we examined respondent demographics employing descriptive statistics. This research resolved collinearity concerns, improved model fit, and elucidated the model's explanatory potential. Third, we performed descriptive analyses on the research scales to ascertain mean scores and standard deviations. We employed Structural Equation Modeling (SEM) to analyze the direct and indirect relationships among the constructs in the research framework (Hair et al., 2019).

4. Results

4.1 Demographic profile

The demographic profile of the respondents shows that the majority fall within the age groups of 31-40 (28.0%) and 41-50 (33.6%), with a smaller proportion being either younger than 30 (22.4%) or older than 50 (16.0%). Most respondents are male (61.6%), while females make up 38.4% of the sample. In terms of firm geographics, 74.6% of the firms are located in urban areas, with only 25.4% in rural areas. Regarding firm age, a significant portion of firms (33.6%) have been operating for 6-10 years, followed by firms aged 4-5 years (22.4%) and 11-15 years (18.7%), with fewer firms less than 3 years old (9.3%) or older than 15 years (16.0%). Firm size varies, with the majority (37.3%) having 11-25 employees, followed by 28.0% with 5-10 employees, and smaller percentages for firms with less than 5 (5.6%) or more than 50 employees (10.4%). Lastly, in terms of industry sectors, the majority are in manufacturing (42.9%), with 34.7% in services and 22.4% in the primary sector.

Table 1: Social demographics

Characteristics	Categories	Frequency (N)	Percentage (%)
Respondent Age	Up to 30	120	22.4%
	31-40	150	28.0%
	41-50	180	33.6%
	51-60	86	16.0%
	Total	536	100%
Respondent Gender	Male	330	61.6%
	Female	206	38.4%
	Total	536	100%
Firm Geographics	Urban	400	74.6%
	Rural	136	25.4%
Firm Age	01- 3 Years	50	9.3%
	4-5 Years	120	22.4%
	6-10 Years	180	33.6%
	11-15 Years	100	18.7%
	More than 15 Years	86	16.0%
	Total	536	100%
Firm Size	Less than 5	30	5.6%
	5-10	150	28.0%
	11-25	200	37.3%

	26-50	100	18.7%
	More than 50	56	10.4%
	Total	536	100%
Industry Sectors	Primary	120	22.4%
	Manufacturing	230	42.9%
	Services	186	34.7%
	Total	536	100%

4.2 SEM model Test

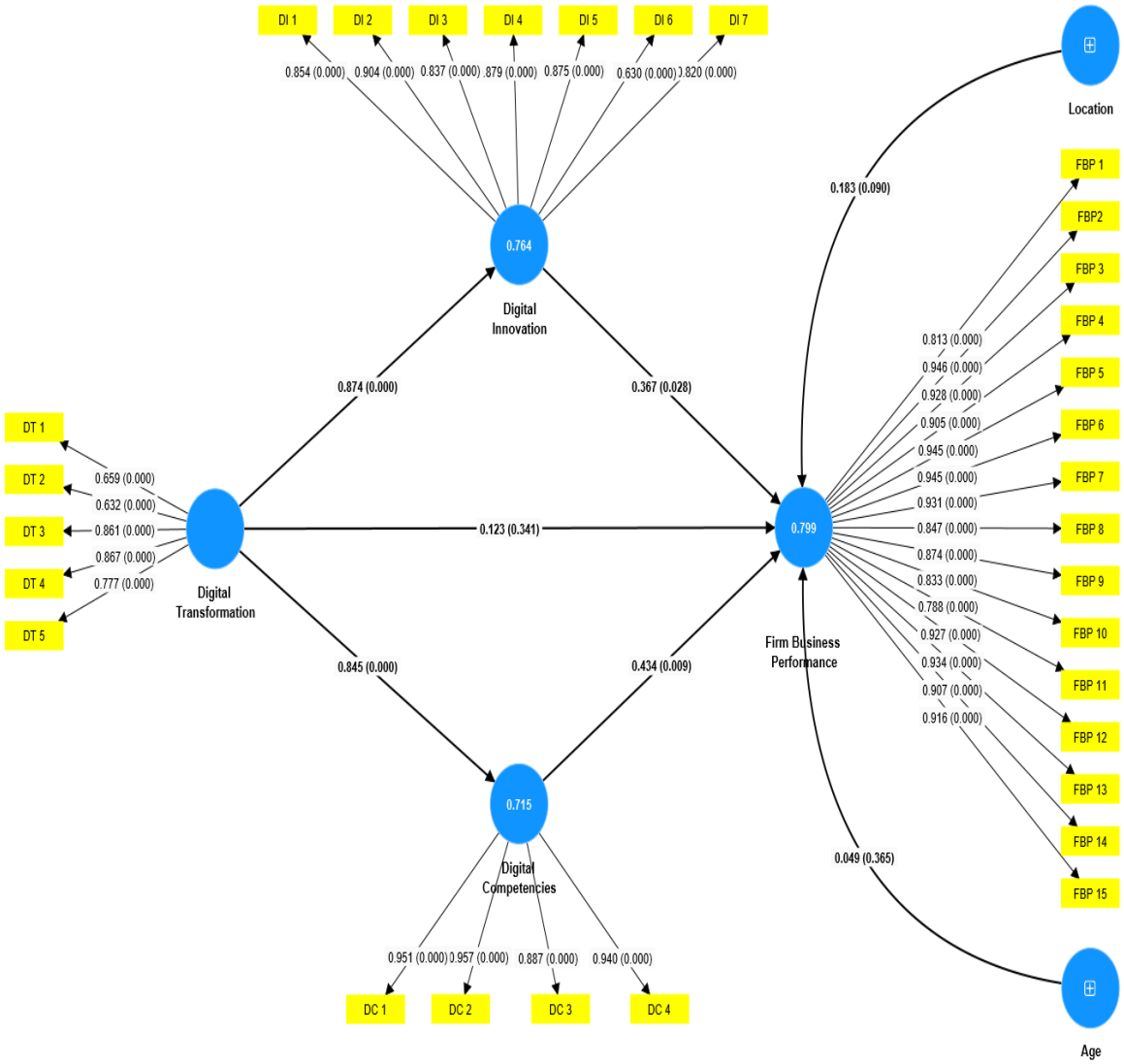


Figure No. 3-1: Model analysis

Table 2 presents the reliability and validity metrics for four constructs: Digital Innovation, Digital Transformation, Digital Competencies, and Firm Business Performance. The constructs are evaluated using factor loadings, Cronbach's alpha, composite reliability (rho_a and rho_c), and average variance extracted (AVE). High factor loadings across all constructs indicate strong correlations between the items and their respective constructs, with values generally over the 0.7 threshold, so demonstrating substantial convergent validity. Cronbach's alpha scores for all constructions exceed the acceptable threshold of 0.7, ranging from 0.822 to 0.982, indicating strong internal consistency. The composite reliability values (rho_a and rho_c) for each construct are high, hence confirming the trustworthiness of the measurement models. The AVE values, which assess the variation recorded by the construct in relation to the variance due to measurement error, surpass the 0.5 threshold, indicating adequate convergent validity. Digital competencies and firm business performance exhibit remarkably high reliability and validity metrics, with Cronbach's alpha and composite reliability values nearing 1.0. The table indicates that the constructs employed in the study are both trustworthy and valid, establishing a robust basis for subsequent analysis.

Table 2: Reliability and validity

Variables	**Factor loading**	**Cronbach's alpha**	**rho_a**	**rho_c**	**AVE**
Digital Innovation		0.924	0.937	0.94	0.693
DI 1	0.854				
DI 2	0.904				
DI 3	0.837				
DI 4	0.879				
DI 5	0.875				
DI 6	0.630				
DI 7	0.820				
Digital Transformation		0.822	0.856	0.875	0.586
DT 1	0.659				
DT 2	0.632				
DT 3	0.861				
DT 4	0.867				
DT 5	0.777				
Digital Competencies		0.951	0.952	0.965	0.873
DC 1	0.951				
DC 2	0.957				
DC 3	0.887				
DC 4	0.94				
DC 1	0.951				
Firm Business Performance		0.982	0.983	0.984	0.805

FBP 1	0.813
FBP 2	0.833
FBP 3	0.788
FBP 4	0.927
FBP 5	0.934
FBP 6	0.907
FBP 7	0.916
FBP 8	0.928
FBP 9	0.905
FBP 10	0.945
FBP 11	0.945
FBP 12	0.931
FBP 13	0.847
FBP 14	0.874
FBP 15	0.946
FBP 16	0.813

Table 3 presents Digital Competencies, Digital Transformation, Digital Innovation, and Firm Business Performance using the (HTMT). Discriminant validity ensures that the constructs are distinct and not overly correlated with one another. The HTMT values are used to assess this, where a value below 0.90 is generally considered acceptable, indicating adequate discriminant validity. The values in the table show that the HTMT ratios for all pairs of constructs are close to but do not exceed the 0.90 threshold, which suggests that each construct is distinct from the others. For example, the HTMT value between Digital Competencies and Digital Transformation is 0.893, and between Digital Competencies and Digital Innovation, it is 0.883. The highest HTMT value is between Digital Transformation and Firm Business Performance at 0.887, which is still within the acceptable range. These results confirm that the constructs have adequate discriminant validity, meaning that each construct measures a different concept without significant overlap with the others.

Table 3: Discriminant validity analysis (HTMT)

Construct	**Digital Competencies**	**Digital Transformation**	**Digital Innovation**	**Firm Business Performance**
Digital Competencies	1			
Digital Transformation	0.893	1		
Digital Innovation	0.883	0.873	1	
Firm Business Performance	0.886	0.887	0.795	1

Table 4 examines potential collinearity issues among the constructs Digital Competencies, Digital Innovation, and Firm Business Performance by presenting the Variance Inflation

Factor (VIF) values. The VIF values indicate the extent of collinearity, with a VIF value below 5 generally considered acceptable, suggesting no severe multicollinearity. Table 4 shows that the VIF values for Digital Transformation with Digital Competencies, Digital Innovation, and Firm Business Performance are all below the threshold of 5, specifically 1, 3.203, 3.859, and 3.173, respectively. These values indicate that there is no significant collinearity among the constructs, meaning that each construct contributes independently to the model without excessive correlation with others. The results suggest that the constructs are distinct in their predictive power and that multicollinearity is not a concern in this study, ensuring the robustness of the regression model.

Table 4: Collinearity analysis among constructs

Dimensions	DC	DI	FBP	
Digital _Competencies				3.203
Digital Transformation		1	1	3.859
Digital Innovation				3.173

Note: Digital Competencies (DC), Digital Innovation (DI), Firm Business Performance (FBP).

Table 5 presents the SRMR value of 0.076 suggests an acceptable fit, as it is below the 0.08 threshold, indicating minimal differences between observed and predicted correlations. The d_ULS (3.204) and d_G (13.72) values, which measure discrepancies between observed and model-implied covariance matrices, are relatively low, indicating a decent fit. The Chi-square value of 3765.297, though high, is typical in large samples, where significant differences may be detected even with a good model fit. However, the NFI value of 0.508 indicates that the model's fit compared to a baseline model is less than ideal, suggesting that there may be room for improvement in the model to better capture the observed data. Overall, while the SRMR and discrepancy measures indicate a reasonable fit, the NFI suggests the model could be further refined.

Table 5: Model fit indices for the saturated model

F	Saturated model	Estimated model
SRMR	0.076	0.085
d_ULS	3.204	4.051
d_G	13.72	13.724
Chi-square	3765.297	3798.354
NFI	0.508	0.504

This study R-square values for three constructs: Digital Competencies, Digital Innovation, and Firm Business Performance. A high R-square value signifies enhanced explanatory power of the model. The R-square value for Digital Competencies is 0.715, signifying that 71.5% of the variance in this construct is explained by the model. The R-square score for Digital Innovation is 0.764, indicating that 76.4% of its variance is accounted for by the model. Firm Business Performance demonstrates the highest R-square value of 0.799, signifying that 79.9% of its variance is explained by the model. The high R-square values demonstrate that the model effectively explains the variance in these constructs, indicating considerable explanatory power and confirming that the independent variables included in the model are important predictors of these outcomes.

This research delineates the examination of direct correlations among Digital Transformation, Digital Innovation, Digital Competencies, and Firm Business Performance. The correlation between Digital Transformation and Firm Business Performance (H1) was shown to be non-significant, with a coefficient of 0.123 and a p-value of 0.341, resulting in the rejection of H1. Digital Transformation exerts a substantial influence on Digital Innovation (H2) and Digital Competencies (H3), with coefficients of 0.874 and 0.845, respectively, both exhibiting p-values of 0.000, signifying strong and significant positive effects. Additionally, both Digital Innovation (H4) and Digital Competencies (H5) exhibit substantial positive impacts on Firm Business Performance, with coefficients of 0.367 and 0.434, and p-values of 0.028 and 0.009, respectively. These findings validate the significance of Digital Innovation and Digital Competencies as essential catalysts for Firm Business Performance.

The analysis encompasses the influence of control factors, including Location and Age, on Firm Business Performance. The correlation between Location and Firm Business Performance exhibits a coefficient of 0.183 and a p-value of 0.090, suggesting a moderate effect that nears statistical significance. The influence of Age on Firm Business Performance is negligible, evidenced by a coefficient of 0.049 and a non-significant p-value of 0.365, indicating that Age does not significantly affect Firm Business Performance in this model. Digital Transformation affects Firm Business Performance via mediators like Digital Innovation and Digital Competencies. Hypothesis H6, which investigates the indirect influence of Digital Transformation on Firm Business Performance through Digital Innovation, is substantiated with a coefficient of 0.321, a T-value of 2.089, and a p-value of 0.037, signifying a notable mediation effect. Hypothesis H7 is accepted, indicating that Digital Transformation positively affects Firm Business Performance via Digital Competencies, with a coefficient of 0.367, a T-value of 2.465, and a p-value of 0.014. The findings indicate that Digital Innovation and Digital Competencies act as crucial mediators in the link between Digital Transformation and Firm Business Performance.

Table 6: Direct and indirect

	Direct Relationships	Coefficient	Mean	SD	T Value	P values	Results
H1	Digital Transformation -> Firm Business Performance	0.123	0.099	0.129	0.953	0.341	Rejected
H2	Digital Transformation -> Digital Innovation	0.874	0.876	0.032	27.596	0.000	Accepted
H3	Digital Transformation -> Digital Competencies	0.845	0.848	0.039	21.606	0.000	Accepted
H4	Digital Innovation -> Firm Business Performance	0.367	0.390	0.167	2.196	0.028	Accepted
H	Digital Competencies ->	0.434	0.439	0.1	2.628	0.009	Accepted

5	Firm Business Performance			65			
H 6	Digital Transformation -> Digital Innovation -> Firm Business Performance	0.321	0.344	0.1 54	2.089	0.037	Accepted
H 7	Digital Transformation -> Digital Competencies -> Firm Business Performance	0.367	0.375	0.1 49	2.465	0.014	Accepted

5. Discussion

The current study focused on the relationships between digital transformation, digital innovation, digital capabilities, and firm business performance. The results indicate valuable connections between variables within the research framework. Most studies of this kind have been conducted in advanced countries, with limited research done in Pakistan. This study is unique as it is the first to measure the associations between digital transformation, digital innovation, digital competencies, and firm business performance in the context of SMEs, and also the first to consider digital innovation and digital competencies as mediating variables.

Initially, we discovered that digital transformation exerted a positive and considerable impact on organizational business performance hence validating H1. These findings align with prior research indicating that digital transformation correlates with FBP. This finding aligns with several research in the literature investigating the correlation between digital transformation and corporate performance. Nonetheless, there is no consensus on this matter. Conversely, a dispute persists, accompanied by divergent perspectives, particularly about the financial implications of digital transformation (Yu, 2023). Consequently, our discovery enhances this discourse by providing empirical evidence. We performed a comprehensive review utilizing several databases and identified a favorable correlation between digital transformation and organizational business success (Al-Debei and Avison, 2010).

Secondly, we discovered that digital transformation exerts a favorable and considerable impact on digital innovation, hence validating our second hypothesis (H2). These findings correspond with prior studies that have similarly demonstrated a relationship between digital transformation and digital innovation. Furthermore, we noted that enhanced digital transformation forecasts digital innovation in Pakistani SMEs. A recent study revealed that the adoption of digital transformation in small and medium-sized firms led to increased digital innovation and enhanced productivity. The transition of SMEs to digital operations is expected to be a major indicator of digital innovation (Vial, 2019).

Third, we analyzed the relationship between digital transformation and digital competencies and found a positive and significant correlation, thereby validating H3. These findings corroborate prior studies indicating the beneficial effects of digital transformation on digital competencies (Bouwman et al., 2018). Our findings indicate a positive correlation between

DT and digital competencies, implying that DT may have impacted digital competencies, particularly in the context of SMEs.

Fourth, our investigation demonstrated a clear and advantageous relationship between digital innovation and company performance (Bocken and Snihur, 2020). Digital innovation demonstrated a significant and positive correlation with organizational business performance, hence supporting H4. These findings correspond with prior research indicating that digital innovation has a positive correlation with company performance. Previous studies have established a relationship between digital innovation and company performance. Thus, we may determine that digital innovation can significantly and positively impact business performance in SMEs in Pakistan, leading to improvements in both digital innovation and corporate performance.

Fifth, we identified a direct positive correlation between digital competences and organizational success (Teece, 2018). Digital competences exhibited a substantial and favorable correlation with organizational business success, hence validating H5. These findings correspond with prior research that similarly identified a positive correlation between digital competencies and organizational effectiveness. Additional research (Li et al., 2017; Brink and Holmén, 2009) has similarly established that digital competencies serve as a predictor of corporate performance. This indicates that digital capabilities (Gong and Ribiere, 2021) contribute to enhancing company performance in SMEs in Pakistan.

Sixth, we found that digital innovation acts as a favorable mediator in the connection between digital transformation and FBP. The results demonstrate that digital innovation mediates the connection between digital transformation and organizational performance, thereby confirming H6.1 and supporting previous research indicating that digital innovation (Bouwman et al., 2018) and digital transformation are positive predictors of business performance. Moreover, digital competencies (Verhagen et al., 2023) mediate the connection between digital transformation and organizational performance, thus corroborating H6.2 and aligning with prior research (Teece, 2018) that demonstrates the relationship among digital innovation, digital transformation, and improved organizational performance. Thus, it is likely that other factors, in addition to digital transformation and digital innovation, affect the business success of SMEs in Pakistan. This study demonstrates that digital innovation and digital competences positively affect SME performance, emphasizing their impact on performance variation. This comprehension can assist SMEs in allocating resources towards digital transformation to improve their performance.

This study provides numerous substantial theoretical additions to the literature on digital transformation, digital innovation, and digital capabilities within the context of SMEs. Initially, it demonstrates a favorable correlation between digital transformation and digital innovation as well as digital competences, indicating that participation in digital transformation can catalyze inventive alterations in business models, which is essential for improving competitiveness. The research empirically examines and advocates for the mediating role of digital innovation and digital competencies in the relationship between digital transformation and business performance, thereby enhancing the comprehension of digital innovation and digital competencies as essential mechanisms that convert digital transformation initiatives into superior performance outcomes for innovative SMEs. The paper also examines the lack of empirical research about the direct impact of digital

transformation on the performance of SMEs, emphasizing the distinctive traits of innovative SMEs as a boundary condition that affects these dynamics. Moreover, it underscores the necessity of not just devising but also proficiently executing new business models, since the efficacy of digital innovation and digital competences depends on the firm's talents and resources. The findings strengthen the comprehension of how digital transformation may be utilized via digital innovation and digital competences to improve the performance of innovative SMEs, establishing a framework for future research in this domain.

Our research study both theorizes and empirically tests the mediating role of digital innovation & digital competencies in the relationship between digital transformation and the firm business performance of SMEs. This contributes to our understanding of digital innovation & digital competencies as an important mediator mechanism and a relevant factor in the competitiveness of SMEs. Our study aligns with the call made by (clauss et al., 2021) to expand our perception of digital innovation & digital competencies as a strategic intermediary mechanism. While innovating the business model can be challenging it can significantly benefit SMEs, making their digital transformation efforts meaningful and enhancing their performance. digital innovation & digital competencies in the business model are crucial for maximizing the potential of digital transformation (chesbrough, 2010; sabaruddin et al., 2023). However, SMEs should acknowledge that the success of digital innovation & digital competencies relies on both its proper design and implementation (verhagen et al., 2023). In this context, emphasized that a firm's competitiveness may suffer due to digital innovation & digital competencies if the firm lacks the necessary capabilities to execute a new business model. Consequently, the implementation of a new business model may face delays or failures (sabaruddin et al., 2023). Digital innovation and digital capabilities serve as a mediating factor in the interaction between digital transformation and the performance of SMEs, demonstrating both support and relevance. Managers of SMEs should strive for an optimal resource equilibrium among digital transformation, digital innovation, and digital competencies to synchronize innovations. SMEs should recognize that the proper implementation of digital innovation can result in increased productivity.

5.1 Conclusion

The study concludes that digital transformation plays a crucial role in enhancing the performance of SMEs business performance, with digital innovation & digital competencies serving as a significant mediating factor in this relationship. As firms navigate an increasingly complex and ambiguous competitive environment driven by digital technologies, engaging in digital technologies becomes essential for strategic change. However, the research highlights that an overemphasis on digital transformation without corresponding innovations in the business model may lead to suboptimal performance outcomes. Therefore, it is vital for SMEs management to actively pursue digital innovation strategies for creating, delivering, and capturing value, ensuring that digital competencies effectively leverage the benefits of digital transformation. The findings not only advance theoretical understanding but also offer practical insights for both innovative and traditional SMEs seeking to differentiate themselves in the market and improve their performance through strategic innovation efforts.

5.2 Implications

The study highlights several implications for SMEs regarding digital transformation, digital innovation and digital competencies. Firstly, it underscores the importance of integrating digital innovation and digital competencies with digital transformation efforts, as both (digital innovation and digital competencies) serve as a critical mediator that enhances the positive relationship between DT and firm performance. This suggests that SMEs should strategically align their digital initiatives with digital innovation and digital competencies to maximize performance outcomes. Additionally, the findings indicate that SMEs management must actively engage in creating and capturing value through digital innovation practices, which can help mitigate the risks associated with employee resistance and inertia during the transformation process. Furthermore, the research points out that resource limitations can pose significant challenges for SMEs in implementing digital transformation and digital innovation & digital competencies, emphasizing the need for careful resource assessment and investment. Lastly, the study suggests that cultural and regional factors should be considered when developing digital transformation, as these can influence the effectiveness of the digital transformation efforts. Overall, these implications provide a roadmap for SMEs to navigate the complexities of digital transformation effectively.

5.4 Limitation and future research

This paper identifies several limitations that may affect the findings. Firstly, the research focuses exclusively on innovative SMEs from Pakistan, which could introduce cultural or regional biases, limiting the applicability of the results to other contexts. Additionally, the reliance on a single directory for sampling may lead to sampling bias, as firms listed may not represent the entire population of SMEs in Pakistan. The study also uses cross-sectional perceptual data from CEOs and owners, which, while validated, may not fully capture objective performance measures. Furthermore, the complexity of digital transformation and digital innovation & digital competencies is acknowledged, suggesting that future studies should develop more nuanced measurement scales to better understand these concepts. Lastly, the paper emphasizes the need to explore other internal and external factors that may mediate or moderate the relationship between digital transformation and SMEs performance, indicating that the current focus on digital innovation and digital competencies as an intermediary mechanism may not encompass the full potential of digital transformation.

Future research could explore competitive differences across various industries or countries to validate the results and examine whether non-innovative SMEs experience similar benefits from digital transformation. Moreover, the study emphasizes the need for more advanced measurements of digital transformation and digital innovation & digital competencies to capture their complexities more effectively. Lastly, investigating the role of SMEs capabilities and other internal and external factors could provide deeper insights into how these elements influence the relationship between digital transformation and SME performance. These avenues present exciting opportunities for advancing knowledge in this area.

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