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INFLUENCING FACTORS OF DIGITAL TRANSFORMATION IN DEVELOPING ECONOMIES: A CASE STUDY OF MALAYSIA'S SME SECTOR

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ABSTRACT

The digital transformation of SMEs encompasses more than the mere adoption of new technologies; it necessitates comprehensive changes in business processes, organizational structures, and corporate culture. This research leverages the technical, organizational, and environmental (TOE) framework to examine SME leaders' perspectives on the key elements driving digital transformation within their organizations, focusing specifically on organizational factors. Data were collected from 232 Malaysian SME leaders and analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to ensure reliability and test the hypotheses. The findings indicate that digital strategy, technical capability, and managerial capability significantly influence SMEs' ability to digitalize their business processes. These conclusions are framed within the Malaysian context of SMEs, acknowledging that the industrial type of SME participants was not controlled for. The study suggests that SME leaders should formulate strategies to streamline digital transformation and invest in organizational and technological resources to enhance their digitalization efforts, thereby improving their capabilities and international competitiveness.

Keywords: digital transformation, SMEs, digital strategy, technical capability, managerial capability, PLS-SEM

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1. INTRODUCTION

The role of digital transformation has evolved from merely supporting the business to becoming an integral part of the business itself (Bouwman et al., 2019). Digitalization is the process of reorganizing companies, societies, and even economies at the system level (Bouwman et al., 2019) . This process should not be seen simply as the incorporation of new technologies or the upgrading of existing ones, but rather as a fundamental shift in the established business model (Loebbecke &

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Picot, 2015). Consequently, developing this procedure is essential for company growth. For instance, technological advancements, such as social media, have significantly transformed how organizations manage their relationships with consumers (Pichagonakesit et al., 2023). Indeed, digital transactions are becoming essential in the new normal of COVID-19 (May & Latip, 2021). Small and medium-sized enterprises (SMEs) can leverage this transformation to harness the benefits of digitalization, much like large corporations, governments, and international entities do (Bharadwaj et al., 2013).

SMEs are regarded as the backbone of the industry due to their significant role in the economy (Ahmad et al., 2015). The economic strength of a country is often proportional to the segment of SMEs in its economy (Saleh & Ndubisi, 2006). Critically, information technology (IT) investments primarily facilitate and encourage innovation. Studies have shown that well-designed and developed technologies, such as websites, have a significant emotional impact on users (Scupola, 2014). SMEs can leverage such sentiment to position themselves better in the market. To enhance engagement, SMEs must increase the adoption of electronic technologies in their operations (Turumogan et al., 2019). However, unlike major enterprises, SMEs are unable to spend large sums of money on digital technologies (Alam et al., 2011). As a result, adopting technology and digitalizing SME operations has been slower and more challenging than anticipated (Subba Rao et al., 2003). The digitalization efforts of SMEs have been constrained by deficient internal knowledge, technological competency, firm size, insufficient funds, and a lack of resources (Parker & Castleman, 2007).

Despite these constraints, numerous scholars have investigated the factors influencing SMEs' adoption of electronic technology from various angles. Dharmalingam and Kannabiran (2011) identified elements affecting electronic data exchange in small organizations. Hashim (2008) reviewed previous research to identify the criteria distinguishing e-commerce adopters from non-adopters, finding that the discriminant function explains only 19.4% of SMEs' variation in e-commerce adoption, suggesting potential conflicts among model components. Moreover, Bajwa et al. (2005) applied the diffusion of innovations (DOI) model to examine the variables influencing the adoption of information and communications technology (ICT) by SMEs, recommending additional models for a more comprehensive understanding. Cui et al. (2008) used a modified technological acceptance model to analyze the adoption and dissemination of smart learning within SMEs from a human resource development management perspective, comparing it to more giant corporations. Furthermore, Duan et al. (2012) explored the likelihood of SMEs adopting various enterprise systems, such as e-procurement, supply chain management, customer relationship management, and enterprise resource planning systems, and highlighted that studying these systems collectively makes it challenging to isolate the specific influences affecting each individual system.

However, many studies have statistically examined the broad factors influencing the adoption of information technology among small and medium-sized enterprises (SMEs), often without a specific focus on the organizational-related factors of the business. Indeed, a study by Subba Rao et al. (2003) explored how organizational readiness and external IT handling readiness affect the success of digitalization in less developed and developing nations. Their findings highlighted a critical area for future research: understanding the specific factors that influence technology adoption within SMEs. It is also supported by another study on the survival and thriving of SMEs,

which includes technology adaptation within total quality management (Kassab et al., 2023). This study aims to build on their work by investigating these factors in the context of Malaysian SMEs.

In the context of Malaysia, the country has a relatively small geographical area and population, with over 80% of the population having access to communications infrastructure, including landlines, mobile phones, and Internet services. This high level of connectivity suggests a substantial potential for Malaysian SMEs to adopt digital technology. Malaysia is a prosperous emerging nation with a technical objective to invest approximately 28 billion ringgits to enhance the current 4G mobile communications infrastructure and deploy 5G by the end of 2021, with an initial private sector investment of 15 billion ringgits (Gong, 2023).

Due to the ambiguity surrounding the extent to which SMEs in Malaysia can transition towards digitalization and the factors influencing this transformation, this study aims to address the gap identified in existing research. Researchers seek to identify the primary organizational factors influencing the digital transformation process among Malaysian SMEs, considering various aspects. The Technological, Organisational, and Environmental (TOE) model serves as the study's foundation for several reasons, including its ability to address potential hidden differences between factors and to anticipate digital transformation within Malaysian SMEs from the perspective of their leaders. Thus, this investigation has generated hypotheses for testing. The Structural Equation Modeling (SEM) approach is employed. This study also aims to remove uncertainty by focusing on digital transformation rather than the use of specific electronic technologies. Therefore, this article's primary objective is to explore Malaysian SME leaders' perspectives regarding the fundamental elements driving the digital transformation of their respective SMEs.

2. LITERATURE REVIEW

2.1 Small and Medium Enterprises (SMEs)

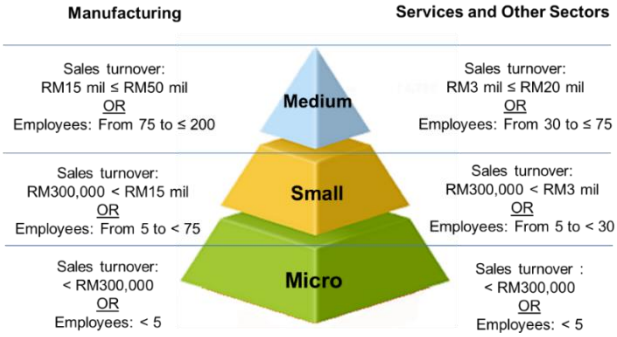
SMEs are defined by specific personnel numbers and financial metrics criteria, tailored to the local economic context (Ammeran et al., 2023). According to SME Corporation Malaysia, SMEs are categorized into micro, small, and medium-sized enterprises based on the number of employees and annual sales turnover. For the manufacturing industry sector, Micro-enterprises typically employ fewer than five people and have an annual sales turnover of less than RM 300,000. Small enterprises employ between 5 to 75 people, with an annual sales turnover ranging from RM 300,000 to less than RM 15 million. Medium-sized enterprises employ between 75 to 200 people, with an annual sales turnover ranging from RM 15 million to not exceeding RM 50 million (SME Corporation Malaysia, 2013).

Meanwhile, for services and other sectors, Micro-enterprises typically employ fewer than five people and have an annual sales turnover of less than RM 300,000. Small enterprises employ between 5 to 30 people, with an annual sales turnover ranging from RM 300,000 to less than RM 3 million. Medium-sized enterprises employ between 30 to 75 people, with an annual sales turnover ranging from RM 3 million to not exceeding RM 20 million (SME Corporation Malaysia, 2013).

SMEs in Malaysia are predominantly independent businesses managed directly by their owners, which allows for greater flexibility and quicker decision-making processes compared to larger

firms (Ammeran et al., 2023). These enterprises generally serve local and niche markets, though some also engage in international trade. SMEs play a vital role in Malaysia's economy by driving innovation, creating employment opportunities, and contributing to economic growth (SME Corporation Malaysia, 2013).

Figure 1. Detailed definition of SMEs



Source: SME Corporation Malaysia (2013)

2.2 Underpinning model and reasoning

Various studies have explored how individuals respond to the introduction of new technology, employing models like the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT) (Arvie & Tanaamah, 2019). However, different models may offer valuable insights within organizational contexts, particularly among SMEs. Cao and Niu (2019) proposed a perception-based framework for understanding the electronic data exchange among small businesses, utilizing the technological, organizational, and environmental (TOE) model.

The study focuses on investigating in detail the organizational-related factors that influence SMEs' digitalization transformation, which is crucial for several reasons. Digitalization involves more than just adopting new technologies; it requires changes in business processes, organizational structures, and corporate culture. Thus, examining organizational-related factors with support from the underpinning TOE model helps to comprehensively understand these multifaceted factors and identify unique enablers within SMEs. SMEs have distinct characteristics, such as limited resources, less formalized processes, and closer relationships with customers. Understanding organizational factors helps in developing tailored strategies that consider these specific needs, leading to more effective digital transformation efforts.

The TOE model also offers a structured framework for empirical research, validating theories and identifying best practices in digital transformation, helping other SMEs navigate their digitalization journeys. As outlined by Baker (2012), the TOE model guides the study's philosophy, aiding in unravelling the complexities of SMEs' digital transformation efforts. Thus, investigating organizational-related factors is essential for understanding the comprehensive landscape of digital transformation within SMEs, addressing unique challenges, enhancing operational efficiencies, adapting to market changes, making informed decisions, and contributing to the broader

knowledge base on digitalization in small and medium-sized enterprises (Baker, 2012; Zhou et al., 2019)

Moreover, organizational factors such as leadership, employee competencies, and internal processes play a crucial role in the success of digitalization initiatives. Detailed investigation into these factors helps identify best practices and areas needing improvement to maximize digital transformation benefits. Additionally, the rapidly evolving business environment, driven by digital advancements, requires SMEs to adapt to remain competitive (Baker, 2012; Zhou et al., 2019). Understanding organizational factors through models like TOE can help SMEs build the necessary capabilities to respond effectively to market dynamics. Informed decision-making about digital investments is critical for SMEs to overcome resource constraints. Examining organizational factors provides insights into the readiness for digital transformation, potential impacts, and required resources leading up to the strategic decisions.

2.3 Digital transformation

Numerous studies have delved into the factors, resources, and skills essential for digital transformation within organizations, along with the advantages of process transformation (Li et al., 2017). Digital transformation is a socio-cultural process where companies adapt to new organizational forms and acquire the necessary skills to thrive in the digital age, transcending simple digitization and digitalization. This comprehensive shift is primarily driven by advancements in information technology (IT), as stated by Saarikko et al. (2020). Digital transformation enables companies to respond effectively to environmental changes by leveraging emerging technologies to innovate and enhance their value-creation processes.

Besides, digital transformation in business involves significant alterations in organizational characteristics, leading to a comprehensive restructuring of organizational behaviour and operating systems through the integrated application of IT, computing, communication, and connectivity technologies (Teng et al., 2022). By adopting ICT in business, SMEs can enhance their competitiveness by improving efficiency, reducing operational costs, and enabling better decision-making through data analytics. Digital transformation can also drive innovation, allowing SMEs to develop new products and services, enter new markets, and respond more swiftly to customer demands (Ammeran et al., 2023).

Given the pivotal role of digital transformation, studying the factors influencing small and medium-sized enterprises (SMEs) to adopt these changes is crucial. SMEs often face unique challenges such as limited resources, inadequate digital skills, and resistance to change. Understanding these factors is vital for developing strategies that can facilitate smoother transitions, ensuring that SMEs can harness the benefits of digital transformation to enhance their competitiveness, efficiency, and innovation in the digital landscape.

2.4 Organizational-related factors

For SMEs to successfully approach digital transformation, their leaders need to adopt a more inclusive leadership style (Zoppelletto et al., 2023). This involves fostering an environment where employees' ideas are encouraged and developed through open communication and interaction.

Additionally, digital transformation demands leadership agility, which refers to the ability to influence and drive changes in the workforce's behaviour and mindset (Zoppelletto et al., 2023).

Strategic planning is crucial in digital transformation, and this responsibility typically falls on the SME's owner or management team. While the breadth of the enterprise can increase internal, search, and storage costs, investing in technology should be proportional to the firm's size. Digitalization can help businesses reduce these expenses. The size of the business is a critical factor in adopting digitalization; larger companies are generally more likely to adopt digitalization than smaller ones. However, the anticipated benefits and challenges significantly influence this adoption. Large enterprises often face bureaucratic hurdles that can slow down digital strategies, managerial support, technological skills development, managerial competence, and incentive processes (Zoppelletto et al., 2023).

SMEs can transform their processes and activities into digital operations when their IT resources align with the workforce's beliefs and practices. An organizational context that supports innovation and fosters change is also crucial for adopting new technologies. Top and middle management play a key role in promoting digital innovation by communicating its importance, integrating it into the firm's overall strategy, and rewarding innovative behavior among employees (Omrani et al., 2024).

To summarize, this study focuses on three influential factors within the organizational-related components that potentially affect the digital transformation of SMEs. These factors are digital strategy, technical capability, and managerial capability.

2.5 Digital strategy

Digital strategies, where a company's approach to digital technology is integrated into its overall business strategy, are essential for modern businesses (Stoianova et al., 2020). A digital strategy outlines a company's vision in the context of digitization, including the strategic measures needed to achieve this vision. It sets clear digitization objectives and initiatives for the short, medium, and long term, impacting products, services, and value creation, as well as the organization and culture of the business (Gouveia & Mamede, 2022).

Digital transformation begins with leadership, which formulates and supports the implementation of the strategy. According to Korachi and Bounabat (2020), for SMEs to stay competitive in the digital age and address the challenges of digital transformation, they need a comprehensive digital transformation strategy that addresses the implications of digital change and drives operational excellence. Contrary to popular belief, the primary barriers to digital transformation are not just the scale of innovative disruption or the lack of IT infrastructure and technical skills. Instead, the main inhibitors are often due to a lack of leadership and digital agility within the company, as argued by previous scholars (von Leipzig et al., 2017).

Furthermore, according to Stoianova et al. (2021), the lack of a clear digital strategy poses a significant leadership challenge, especially during the initial phases of transformation. Research indicates that well-defined digital strategies and transformation initiatives have the potential to enhance and sustain business performance (Vial, 2019). In summary, organizations that integrate digital processes into their business models experience improved performance and gain a

competitive edge in the market, with the foundation of this success often rooted in the organization's digital strategy. Thus, the following hypothesis is proposed:

Hypothesis 1: *The digital strategy of organizations significantly influences SMEs' digital transformation in business.*

2.6 Technical capability

In today's business landscape that is characterized by rapid technological advancements and intense competition, strategic technology management has become essential. To achieve sustained growth and remain competitive, businesses must continuously evolve and enhance their technological capabilities to create both external and internal impacts within a dynamic socioeconomic environment (Sahlman & Haapasalo, 2009). It is widely recognized that business growth and sustainability are closely linked to technological innovation, which plays a crucial role in creating economic value (Chen & Katilla, 2008). Furthermore, technology management is increasingly seen as a catalyst for business transformation, enabling organizations to adapt to the ever-changing landscape (Unsal & Cetindamar, 2015). This underscores the importance of technical capabilities in facilitating the digital transformation of small and medium-sized enterprises (SMEs) in today's business environment.

At various stages of digital transformation, enterprises have different requirements for organizational structure, culture, growth strategy, and other related resources or capabilities. Effective coordination and adaptation of these elements can promote successful digital transformation (Verhoef et al., 2021). Organizational barriers such as insufficient structure, lack of technological expertise, cultural divides between management and workers, and psychological factors like resistance to change and fear of transition pose significant challenges. These issues reflect the novelty of digitalization and the difficulties organizations face in moving beyond familiar operating environments (Stoianova et al., 2020).

In Malaysia, there are substantial efforts to drive technology adoption through training and skills development, with initiatives aimed at encouraging SMEs to embrace the Internet as a more efficient way of doing business. However, a lack of talent and skill shortages remain major constraints to digital transformation (Kee et al., 2023). According to Hasan et al. (2022), half of Malaysian SMEs are not yet prepared for digitalization due to high costs, a lack of understanding, and a shortage of digital talent in the workforce. This technological lag in turn affects organizational performance. It remains to be seen whether these initiatives can effectively bridge the digital gap.

To summarise, there is ample justification and reasoning to support the notion that technical capabilities are a vital organizational-related factor with significant potential to influence the digital transformation of SMEs. Given the rapid technological advancements and the competitive pressures faced by businesses today, it is essential to understand the role of technical capabilities in the context of the digital transformation of SMEs. Consequently, this leads to the formulation of the following hypothesis for further examination:

Hypothesis 2: *The technical capability of organizations significantly influences SMEs' digital transformation in business.*

2.7 Managerial capability

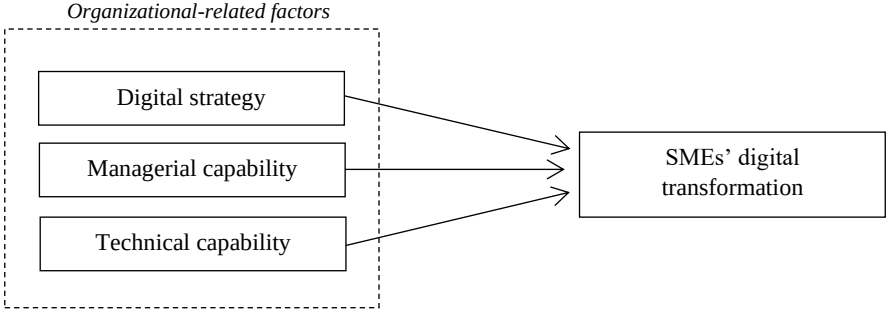
To embark on digital transformation, SME leaders must embrace inclusive leadership styles, fostering an environment conducive to collaborator idea development through bidirectional communication and interaction (Zoppelletto et al., 2023). Furthermore, digital transformation necessitates leadership agility, wherein individuals have the ability to influence workforce behavior and mindset (Zoppelletto et al., 2023). Strategy plays a pivotal role in this transformation, primarily led by SME owners or management, who undertake various tasks from identifying opportunities to mobilizing resources and guiding organizational responses (Malodia et al., 2023). However, research, such as that conducted by Spencer, suggests that SME owners often belong to the late majority category of technology adopters due to factors like culture and the digital divide (Hanifah et al., 2017; Spencer, 2011). Resource constraints and cultural mindsets within SMEs may impede their willingness to embrace new technologies (Spencer, 2011). Regrettably, it is observed that many Malaysian SME owners and managers often demonstrate a deficit in essential managerial insights and organizational competencies (Kassab et al., 2023).

Moreover, top management support fosters an ideal atmosphere for digital transformation and provides resources for digitization (Khatatbeh, 2021). Past studies affirm its importance, with Low et al. (2022) confirming its positive impact on driving technological innovation among Malaysian SMEs. Thus, SME leaders' mindset, coupled with digital knowledge, is crucial for driving digital adoption. Strong innovation beliefs and a willingness to depart from traditional practices are vital for embracing new business approaches.

In summary, management guidance for digital transformation sheds light on how businesses can gain a sustainable competitive advantage by strategically using resources and adjusting internal organizational structures to facilitate digital adaptation (Verhoef et al., 2021). It underscores the necessity of formulating strategies to tackle challenges inherent in digital transformation (Li et al., 2017). However, the potential impact of managerial capability on SMEs' digital transformation merits deeper understanding, given its significance within the organizational-related factors. Consequently, this leads to the formulation of the following hypothesis for further examination:

Hypothesis 3: *The managerial capability of organizations significantly influences SMEs' digital transformation in business.*

Figure 2. Proposed research framework



3. METHODOLOGY

The study was a correlational research utilizing quantitative methods in a non-contrived, cross-sectional setting. It targeted CEOs, owners or managers of SMEs in Malaysia. Simple random sampling was used to select participants. Data were collected via a survey questionnaire designed to explore how technical, organizational, and environmental factors influence the digitalization of Malaysian SMEs. The G*Power software was utilized to calculate the minimum required number of samples (Mayr et al., 2007). The multiple linear regression statistical test with a fixed model R^2 increase under the F test family was used in the analysis. The test was set to a medium effect size of 0.15, with a 0.05 significance value, 0.95 confidence intervals, and three numbers of predictor variables. An actual power of 0.9509 indicated that at least 119 samples were needed. Data were cleansed and screened before hypothesis testing.

Prior to hypothesis testing, the data underwent cleansing and screening. The Statistical Package for Social Sciences (SPSS) and Partial Least Squares Structural Equation Modelling (PLS-SEM) with bootstrapping via SmartPLS software were used for data analysis (Ringle et al., 2024). A total of 232 valid responses were analyzed, surpassing the minimum required sample size of 119. The instruments for the study were adapted and adopted from previously validated research (Baker, 2012; Zhou et al., 2019).

Participants were assured anonymity and were informed about the study's purpose, instructions for completing the questionnaire, and the commitment to maintaining privacy and confidentiality. The questionnaire was divided into two sections: (1) the profile of SMEs and (2) questions related to the adopted factors. Each item associated with the adopted factors was measured on a 5-point Likert scale for hypothesis testing.

4. ANALYSIS AND RESULT

4.1 Respondent profile

The respondent profile analysis uncovered significant demographic trends. Among the 232 respondents, male entrepreneurs constituted the majority, representing 70.7% of the sample, while female entrepreneurs were less represented at 29.3%. This distribution mirrors the prevailing gender dynamics observed within Malaysian society. As for age distribution, 32.3% of the respondents fell within the 36-45 age bracket, and 31.9% were aged over 46, with only a small proportion (6.5%) being younger than 25. These findings suggest that the sample predominantly comprises of older individuals, which diverges from the typically youthful demographic makeup of Malaysia's population. Regarding educational qualifications, a significant majority of respondents (58.2%) held a degree, while 26.3% possessed a diploma, and 15.5% had completed secondary education. This indicates a relatively high level of educational attainment among the respondents. Additionally, all respondents reported holding specific roles within their businesses, with over 36% identifying as CEOs or owners, 33% occupying management positions, and 31% working in support or operations departments. This varied representation across different business roles contributes to a comprehensive understanding of the SME leadership landscape in Malaysia.

4.2 Reliability and validity

The model measurement was undertaken to verify the reliability and validity of the constructs. As shown in Table 1, all items exhibited factor loadings exceeding 0.70, signifying strong factor loadings (Hair et al., 2017). Additionally, the composite reliability (CR) of the constructs was above 0.70, indicating high reliability. The average variance extracted (AVE) for all constructs was greater than 0.50, thereby establishing convergent validity. Furthermore, the Heterotrait-Monotrait ratio of correlations (HTMT) analysis assessed the discriminant validity of the constructs, with all correlations falling below 0.85, thus confirming discriminant validity. Consequently, the survey and dataset are confirmed to be both reliable and valid.

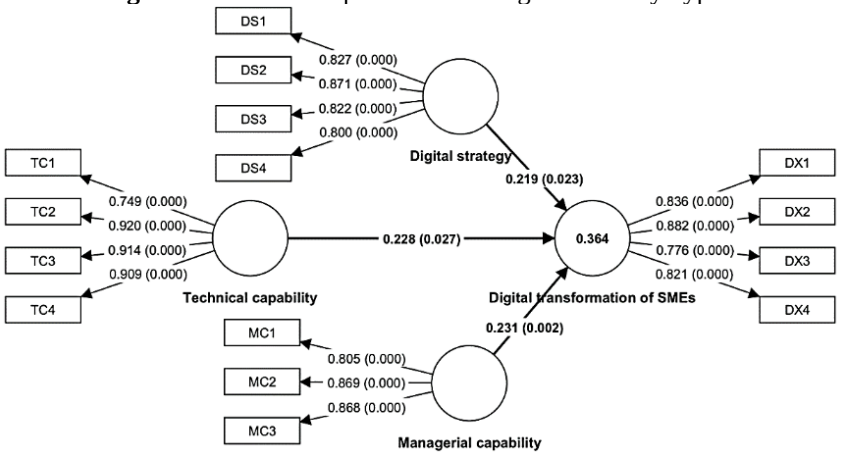
Table 1: Outer loading, composite reliability, discriminant, and convergent validity analysis

Construct and items		Loading	CR	AVE	HTMT			
					DS	DX	MC	TC
Digital strategy (DS)	DS1	0.827	0.869	0.689				
	DS2	0.871						
	DS3	0.822						
	DS4	0.800						
Digital transformation (DX)	DX1	0.836	0.851	0.689	0.621			
	DX2	0.882						
	DX3	0.776						
	DX4	0.821						
Managerial capability (MC)	MC1	0.805	0.925	0.768	0.754	0.613		
	MC2	0.869						
	MC3	0.868						
Technical capability (TC)	TC1	0.749	0.822	0.719	0.846	0.606	0.794	
	TC2	0.920						
	TC3	0.914						
	TC4	0.909						

4.3 Hypothesis testing

Table 2 summarizes the results of the direct path hypothesis testing conducted in this study, which is illustrated in Figure 2. The path analysis was performed using 5000 bootstrap subsamples, which were bias-corrected with a 95% confidence interval. A significance level (p-value) below 0.05 indicated a statistically significant relationship for the paths. Additionally, a t-value greater than 1.96 (two-tailed test) also signified a statistically significant relationship, as noted by Hair et al. (2017).

Figure 3. Structural equation modelling of the study hypothesis testing



The analysis revealed that digital strategy is statistically significant in relation to the digital transformation of SMEs (β = 0.219, t = 2.276, p = 0.0223). Specifically, a one-standard-deviation increase in digital strategy resulted in a 0.219 increase in digital transformation. Consequently, hypothesis H1 was supported, highlighting the critical role of digital strategy in driving digital transformation within SMEs.

Furthermore, hypothesis H2 was supported, demonstrating a positive and statistically significant relationship between technical capability and digital transformation (β = 0.103, t = 2.215, p = 0.027). A one-standard-deviation increase in technical capability led to a 0.226 increase in digital transformation, emphasizing the importance of technical skills and infrastructure in facilitating digital transformation efforts.

Lastly, hypothesis H3 was also supported. The analysis showed a positive and statistically significant relationship between managerial capability and digital transformation (β = 0.231, t = 3.028, p = 0.002). A one-standard-deviation increase in managerial capability corresponded to a 0.308 standard deviation increase in digital transformation. This finding underscores the pivotal role of effective management and leadership in guiding SMEs through the digital transformation process.

Table 2: Summary of hypothesis testing

H	Relationship	Path coefficient	STDEV	*t*-value	*p*-value	Decision
1	DS → DX	0.219	0.096	2.276	0.023	Supported
2	TC → DX	0.228	0.103	2.215	0.027	Supported
3	MC → DX	0.231	0.076	3.028	0.002	Supported
Adjusted $R^2 = 0.355$						

The coefficient of determination (R^2) reported in Table 2 indicates that the model explains 35.5% of the variance in the digital transformation of SMEs. This suggests that while the model successfully captures significant factors influencing digital transformation, 64.5% of the variance is attributed to other factors not included in the study.

5. DISCUSSION

The results of the structural equation modelling reveal that digital strategy, technical capability, and managerial capability are significant factors in influencing digital transformation adaptation for SMEs. This indicates that organizational elements (digital strategy, technical capability and managerial capability) influence SMEs' capacity to digitalize their businesses.

The findings of this study support Hypothesis 1, demonstrating that a well-defined digital strategy significantly influences the digital transformation of SMEs. This aligns with existing literature, which emphasizes the crucial role of integrating digital technology into an overall business strategy (Stoianova et al., 2020). Additionally, this study reinforces the findings of Stoianova et al. (2021), which highlights the significant challenge posed by the lack of a clear digital strategy, particularly during the early stages of digital transformation. The evidence indicates that SMEs with well-defined digital strategies are better positioned to enhance and sustain business performance (Vial, 2021). From the findings of Hypothesis 1, it is evident that integrating digital processes into business models improves performance and provides a competitive edge in the market. A well-defined digital strategy that is integrated into the overall business strategy, provides a clear vision and sets strategic objectives that drive digital transformation initiatives. This strategic approach impacts technological advancements, organizational culture, and value creation. Leadership is critical in this process, as it is responsible for developing and supporting the implementation of the strategy.

Moreover, the findings of this study also support Hypothesis 2, indicating that the technical capability of an organization significantly influences the digital transformation of SMEs. This aligns with the existing literature, underscoring the importance of strategic technology management in today's rapidly evolving business landscape (Sahlman, 2010). Technological innovation is recognized as a critical driver of business growth and sustainability, playing a crucial role in creating economic value (Chen & Katilla, 2008). Moreover, technology management is increasingly viewed as a catalyst for business transformation, enabling organizations to adapt to dynamic market conditions (Unsal & Cetindamar, 2015). Based on the findings, the authors believe that technological innovation and adept technology management are fundamental drivers of business transformation and value creation. SMEs at various stages of digital transformation require adaptable organizational structures, cultural adjustments, and strategic resources to overcome barriers such as gaps in technological expertise and resistance to change.

Lastly, the findings of this study support Hypothesis 3, indicating that the managerial capability of organizations significantly influences the digital transformation of SMEs. Literature suggests that effective leadership styles, characterized by inclusivity and agility, are crucial for fostering environments conducive to digital innovation (Zoppelletto et al., 2023). Top management support is essential for creating an ideal atmosphere for digital transformation and providing resources for digitization (Khatatbeh, 2021). Thus, the authors assert that management guidance for digital transformation plays a pivotal role in enabling businesses to gain a sustainable competitive advantage. By strategically utilizing resources and adapting internal organizational structures to facilitate digital adaptation, SMEs can position themselves more effectively in today's rapidly evolving business landscape. Effective management guidance fosters an environment where innovative digital strategies can be developed and implemented, leading to enhanced efficiency, productivity, and competitiveness. Moreover, as digital technologies continue to shape industries

and redefine business models, ongoing efforts to explore and enhance managerial capabilities become increasingly essential. This includes equipping SME leaders with the necessary knowledge, skills, and mindset to navigate digital challenges and seize opportunities in the digital era. By investing in the development of managerial capabilities, SMEs can not only survive but thrive amidst digital disruption, driving sustainable growth and success in the long term.

5.1 Practical and academic implications

The findings of this study underscore several practical implications for SMEs aiming to navigate digital transformation successfully. Firstly, SME leaders should prioritize the development of effective leadership styles characterized by inclusivity and agility, fostering environments conducive to digital innovation and adaptation. Additionally, senior management's active involvement and commitment to providing resources are crucial for facilitating successful digitization efforts within the organization. Strategic resource allocation and organizational adaptation are imperative in necessitating investments in technology infrastructure, digital talent acquisition, and process restructuring to leverage digital tools effectively. Furthermore, SMEs should embrace innovative digital strategies aligned with their business objectives to enhance efficiency, productivity, and competitiveness in today's dynamic business landscape.

From an academic standpoint, these findings open up various research opportunities to delve deeper into the mechanisms by which managerial capability influences digital transformation within SMEs. Future studies could explore the nuanced aspects of leadership styles, organizational structures, and resource allocation strategies in driving successful digital adaptation. Theoretical contributions are also evident, as this study enriches existing literature by emphasizing the significance of managerial capability in shaping organizational outcomes amidst technological change. Academics can translate these insights into practical guidelines and recommendations to support SMEs in their digital journey, bridging the gap between theory and practice. Additionally, policymakers and industry stakeholders can utilize these findings to design targeted interventions and initiatives to foster managerial capabilities among SMEs, ultimately enabling them to thrive in the digital economy.

5.2 Limitations of the study and future research directions

While this study offers valuable insights into the influence of organizational-related factors on the digital transformation of SMEs, it's important to acknowledge certain limitations. Firstly, the research's scope may be confined to specific geographic regions or industry sectors, potentially limiting the generalizability of its findings. Additionally, reliance on self-reported data or a cross-sectional design may introduce biases and hinder the establishment of causal relationships. Moreover, measuring managerial capability and its impact on digital transformation could be subject to interpretation, necessitating further validation through qualitative or mixed-methods approaches.

In terms of future research, there are several promising directions to address these limitations. Longitudinal studies could provide a more comprehensive understanding of the causal pathways between managerial capability and digital transformation over time. Conducting comparative research across different geographic regions or industry sectors could help in identifying contextual factors that influence the effectiveness of managerial capability in driving digital transformation.

Qualitative methods such as interviews or case studies could offer richer insights into the underlying mechanisms of a managerial capability's influence on digital transformation processes within SMEs. Furthermore, exploring specific aspects of organizational capabilities, such as leadership styles or change in management strategies, could reveal critical drivers of successful digital transformation. Lastly, interdisciplinary approaches that integrate insights from management, technology, and organizational psychology could provide a holistic understanding of the complex dynamics involved in SMEs' digital transformation journeys. By pursuing these research directions, scholars can advance knowledge in this critical area and offer practical insights to support SMEs in their digital endeavours.

6. CONCLUSION

The study has effectively met its research objectives and offers valuable contributions to the understanding of digital adoption among SMEs. It provides insights that can benefit SME leaders by shedding light on the factors influencing the adoption of digital technologies. Understanding these factors can inform the development of policies aimed at enhancing digital technology capability within SMEs. Given the potential impact of digital transformation on company performance and growth, SME managers are encouraged to develop plans and strategies to facilitate the digitalization of their businesses. Additionally, SME owners should focus on establishing organizational and technical infrastructures that are conducive to digitization, while also providing alternatives to traditional transaction methods. This proactive approach can enhance SME competitiveness and improve managerial capabilities. Moreover, investing in digital technology and its components can significantly boost enterprise performance, thereby increasing international competitiveness. Finally, SME owners should seek support from their stakeholders to facilitate the transition to digital business models, ensuring a smoother and more successful transformation process.

REFERENCES

Abu Hasan, N., Abd Rahim, M., Ahmad, S. H., & Meliza, M. (2022). Digitisation of business for small and medium-sized enterprises (SMEs). *Environment-Behaviour Proceedings Journal*, *7*(19), 11-6. https://doi.org/10.21834/ebpj.v7i19.3270

Ahmad, S. Z., Abu Bakar, A. R., Faziharudean, T. M., & Mohamad Zaki, K. A. (2015). An empirical study of factors affecting e-commerce adoption among small- and medium-sized enterprises in a developing country: Evidence from Malaysia. *Information Technology for Development*, *21*(4), 555–572. https://doi.org/10.1080/02681102.2014.899961

Alam, S. S., Ali, Md. Y., & Jani, Mohd. F. Mohd. (2011). An empirical study of factors affecting electronic commerce adoption among SMEs in Malaysia. *Journal of Business Economics and Management*, *12*(2), 375–399. https://doi.org/10.3846/16111699.2011.576749

Ammeran, M. Y., Noor, S., & Yusof, M. (2023). Digital Transformation of Malaysian Small and Medium-Sized Enterprises: A Review and Research Direction. *In Lecture Notes in Networks and Systems* (Vol. 488). https://doi.org/10.1007/978-3-031-08090-6_16

Arvie, D., & Tanaamah, A. R. (2019). Technology acceptance model for evaluating IT of online based transportation acceptance: a case of GO-JEK in Salatiga. *TELKOMNIKA*, *17*(2), 667-675. https://doi.org/10.12928/telkomnika.v17i2.9634

Bajwa, D. S., Lewis, L. F., Pervan, G., & Lai, V. S. (2005). The adoption and use of collaboration information technologies: International comparisons. *Journal of Information Technology*, *20*(2), 130–140. https://doi.org/10.1057/palgrave.jit.2000037

Baker, J. (2012). The technology–organisation–environment Framework. In Y. Dwivedi, M. Wade, & S. Schneberger (Eds.), *Information Systems Theory: Explaining and Predicting Our Digital Society* (eds, Vol. 1). Springer New York. https://doi.org/10.1007/978-1-4419-6108-2_12

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). Digital business strategy: Toward a next generation of insight. *MIS Quarterly*, *37*(2), 471–482.

Bouwman, H., Nikou, S., & de Reuver, M. (2019). Digitalization, business models, and SMEs: How do business model innovation practices improve performance of digitalizing SMEs? *Telecommunications Policy*, *43*(9), 101828. https://doi.org/10.1016/j.telpol.2019.101828

Cao, Q., & Niu, X. (2019). Integrating context-awareness and UTAUT to explain Alipay user adoption. *International Journal of Industrial Ergonomics*, *69*, 9–13. https://doi.org/10.1016/j.ergon.2018.09.004

Chen, E. L., & Katilla, R. (2008). Handbook of technology and innovation management. In *Handbook of Technology and Innovation Management*.

Cui, L., Zhang, C., Zhang, C., & Huang, L. (2008). Exploring IT adoption process in Shanghai firms. *Journal of Global Information Management*, *16*(2), 1–17. https://doi.org/10.4018/jgim.2008040101

Dharmalingam, P., & Kannabiran, G. (2011). Determinants of basic IT adoption by auto ancillary SMEs in India. *The IUP Journal of Information Technology*, *7*(1), 58–75.

Duan, X., Deng, H., & Corbitt, B. (2012). Evaluating the critical determinants for adopting e-market in Australian small-and-medium sized enterprises. *Management Research Review*, *35*(3/4), 289–308. https://doi.org/10.1108/01409171211210172

Gong, R. (2023). *Connecting the Last Mile: Solutions for Rural and Remote Communities*. Discussion paper no. 1/23. Khazanah Research Institute. Available at https://www.krinstitute.org/assets/contentMS/img/template/editor/230731%20rural%20connectivity%20v1.5.1%20pub%202.pdf.

Gouveia, F. D., & Mamede, H. S. (2022). Digital transformation for SMEs in the retail industry. *Procedia Computer Science*, *204*, 671-681. https://doi.org/10.1016/j.procs.2022.08.081

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (2nd Editio). SAGE Publications.

Hanifah, H., Halim, H. A., Ahmad, N. H., & Vafaei-Zadeh, A. (2017). Innovation culture as a mediator between specific human capital and innovation performance among bumiputera SMEs in Malaysia. In *Handbook of Research on Small and Medium Enterprises in Developing Countries*. https://doi.org/10.4018/978-1-5225-2165-5.ch012

Hashim, J. (2008). Learning barriers in adopting ICT among selected working women in Malaysia. *Gender in Management: An International Journal*, *23*(5), 317–336. https://doi.org/10.1108/17542410810887356

Kassab, E. A., Nordin, N., Amlus, M. H., & Ahmad, B. (2023). Survive and thrive: Driving factors for SMEs performance in Malaysia. *International Journal of Business and Society*, *24*(2), 787-816. https://doi.org/10.33736/ijbs.5964.2023

Kee, D. M. H., Cordova, M., & Khin, S. (2023). The key enablers of SMEs readiness in Industry 4.0: a case of Malaysia. *International Journal of Emerging Markets*. Advance online publication. https://doi.org/10.1108/IJOEM-08-2021-1291

Khatatbeh, A. (2021). Using a mixed-methodology to assess innovativeness and adoption of new practices in engineering management in construction industry. *International Journal of System Assurance Engineering and Management*, *12*, 407-418. https://doi.org/10.1007/s13198-021-01080-4

Korachi, Z., & Bounabat, B. (2020). General approach for formulating a digital transformation strategy. *Journal of Computer Science*, *16*(4), 493-507. https://doi.org/10.3844/JCSSP.2020.493.507

Li, L., Su, F., Zhang, W., & Mao, J. Y. (2017). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, *28*(6), 1129-1157. https://doi.org/10.1111/isj.12153

Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *The Journal of Strategic Information Systems*, *24*(3), 149–157. https://doi.org/10.1016/j.jsis.2015.08.002

Malodia, S., Mishra, M., Fait, M., Papa, A., & Dezi, L. (2023). To digit or to head? Designing digital transformation journey of SMEs among digital self-efficacy and professional leadership. *Journal of Business Research*, *157, 113547*. https://doi.org/10.1016/j.jbusres.2022.113547

May, R. Y. Y., & Latip, M. S. A. (2021). The perspectives of street food traders on foreign worker dependency during the COVID-19 pandemic. *SEARCH Journal of Media and Communication Research*, *13*(1), 61–77.

Mayr, S., Erdfelder, E., Buchner, A., & Faul, F. (2007). A short tutorial of GPower. *Tutorials in Quantitative Methods for Psychology*, *3*(2). 51-59. https://doi.org/10.20982/tqmp.03.2.p051

Omrani, N., Rejeb, N., Maalaoui, A., Dabic, M., & Kraus, S. (2024). Drivers of digital transformation in SMEs. *IEEE Transactions on Engineering Management*, *71*, 5030-5043. https://doi.org/10.1109/TEM.2022.3215727

Parker, C. M., & Castleman, T. (2007). New directions for research on SME-eBusiness: insights from an analysis of journal articles from 2003 to 2006. *Journal of Information Systems and Small Business* , *1*(1–2), 21–40.

Pichagonakesit, T., Ueasangkomsate, P., & Sudharatna, Y. (2023). Technology infrastructure, manufacturing technology and sustainable manufacturing practice in SMEs. *International Journal of Business and Society*, *24*(2), 620-628. https://doi.org/10.33736/ijbs.5948.2023

Ringle, C. M., Wende, S., & Becker, J.-M. (2024). *SmartPLS 4. Bönningstedt: SmartPLS*. https://www.smartpls.com

Saarikko, T., Westergren, U. H., & Blomquist, T. (2020). Digital transformation: Five recommendations for the digitally conscious firm. *Business Horizons*, *63*(6), 825-839. https://doi.org/10.1016/j.bushor.2020.07.005

Sahlman, K., & Haapasalo, H. (2009). Elements of strategic management of technology: A conceptual framework of enterprise practice. *International Journal of Management and Enterprise Development*, *7*(3), 319-337. https://doi.org/10.1504/IJMED.2009.026083

Saleh, A. S., & Ndubisi, N. O. (2006). An evaluation of SMEs in Malaysia. *International Review of Business Research Papers*, *2*(1), 1–14.

Scupola, A. (2014). The relation between innovation sources and ICT roles in facility management organizations. *Journal of Facilities Management*, *12*(4), 368–381. https://doi.org/10.1108/JFM-11-2013-0059

SME Corporation Malaysia. (2013). *SME definitions*. SME Corporation Malaysia. https://www.smecorp.gov.my/index.php/en/policies/2020-02-11-08-01-24/sme-definition

Spencer, A. J. (2011). Technology adoption determinants: strategic management implications for small, owner-managed travel firms in Jamaica (Doctoral dissertation). https://eprints.bournemouth.ac.uk/19385/1/Spencer%2CAndrew_Ph.D._Dec.2011.pdf.

Stoianova, O. V., Lezina, T. A., & Ivanova, V. V. (2020). The framework for assessing company's digital transformation readiness. *Vestnik Sankt-Peterburgskogo Universiteta. Ekonomika*, *36*(2), 243-265. https://doi.org/10.21638/spbu05.2020.204

Subba Rao, S., Metts, G., & Mora Monge, C. A. (2003). Electronic commerce development in small and medium sized enterprises. *Business Process Management Journal*, *9*(1), 11–32. https://doi.org/10.1108/14637150310461378

Teng, X., Wu, Z., & Yang, F. (2022). Research on the Relationship between Digital Transformation and Performance of SMEs. *Sustainability (Switzerland)*, *14*(10), 6012. https://doi.org/10.3390/su14106012

Turumogan, P., Baharum, A., Ismail, I., Mohamed Noh, N. A., Ab Fatah, N. S., & Mat Noor, N. A. (2019). Evaluating users' emotions for Kansei-based Malaysia higher learning institution website using Kansei checklist. *Bulletin of Electrical Engineering and Informatics*, *8*(1), 328–335. https://doi.org/10.11591/eei.v8i1.1448

Unsal, E., & Cetindamar, D. (2015). Technology management capability: definitions and its measurement. *European International Journal of Science and Technology*, *4*(2), 181-196.

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889-901. https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. In *Journal of Strategic Information Systems*, *28*(2), 118-144. https://doi.org/10.1016/j.jsis.2019.01.003

von Leipzig, T., Gamp, M., Manz, D., Schöttle, K., Ohlhausen, P., Oosthuizen, G., Palm, D., & von Leipzig, K. (2017). Initialising customer-orientated digital transformation in enterprises. *Procedia Manufacturing*, *8*, 517-524. https://doi.org/10.1016/j.promfg.2017.02.066

Zhou, M., Zhao, L., Kong, N., Campy, K. S., Qu, S., & Wang, S. (2019). Factors influencing behavior intentions to telehealth by Chinese elderly: An extended TAM model. *International Journal of Medical Informatics*, *126*, 118-127. https://doi.org/10.1016/j.ijmedinf.2019.04.001

Zoppelletto, A., Orlandi, L. B., Zardini, A., Rossignoli, C., & Kraus, S. (2023). Organizational roles in the context of digital transformation: A micro-level perspective. *Journal of Business Research*, *157*, 113563. https://doi.org/10.1016/j.jbusres.2022.113563