JISMA
JOURNAL OF INFORMATION SYSTEMS AND MANAGEMENT
Vol. 04 No. 06 (2025) https://jisma.org e-ISSN: 2829-6591

Digital Transformation in Small and Medium Enterprises: A Qualitative Study of Adoption Challenges and Strategies

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Abstract - *Digital transformation has become a strategic necessity for Small and Medium Enterprises (SMEs), yet its implementation remains uneven due to complex technological, organizational, and contextual barriers. This study explores how SMEs navigate the challenges of adopting digital technologies and the strategies they employ to adapt within resource-constrained environments. Using a qualitative multi-case study approach, data were collected through semi-structured interviews, observations, and document analysis involving SMEs across diverse sectors. The findings reveal that technological limitations—such as inadequate infrastructure and high software costs—intersect with financial constraints to restrict the scope of digital adoption. Organizational readiness and human resource capability further influence transformation outcomes, with limited digital literacy and resistance to change emerging as significant inhibitors. Despite these challenges, SMEs demonstrate adaptive resilience by adopting incremental digitization, leveraging collaborative networks, and aligning digital initiatives with their operational contexts. Leadership commitment and capability-building efforts also play crucial roles in shaping transformation pathways. The study contributes to theoretical discourse by extending the relevance of the Technology–Organization–Environment (TOE) framework and the Resource-Based View (RBV) within emerging-market SME contexts. Practically, the findings underscore the need for targeted support systems, affordable digital solutions, and capacity-building programs to enable inclusive digital transformation.*

Keywords*: Digital transformation; SMEs; adoption challenges; qualitative study; digital strategy.*

I. INTRODUCTION

Digital transformation has emerged as a critical driver for the success of Small and Medium Enterprises (SMEs), especially in the context of rapid technological advancements and unexpected global challenges such as the COVID-19 pandemic. The pandemic served as a catalyst, pushing many SMEs to transition to digital operations, underscoring the necessity of adopting digital technologies for survival and competitiveness. Despite the potential benefits of digital transformation—including enhanced efficiency, improved customer engagement, and increased market reach—many SMEs struggle to implement these strategies effectively due to various barriers.

Research identifies several key challenges that hinder SMEs from embracing digital transformation effectively. These include limited digital literacy, inadequate technological infrastructure, and financial constraints, which collectively contribute to resistance to change within organizations. Evidence suggests that SMEs frequently encounter financial limitations that restrict their capacity to invest in digital technologies and employee training (Ta & Lin, 2023). Moreover, cultural and contextual factors—including sector-specific characteristics and regulatory environments—further complicate the adoption of new technologies (Zhang et al., 2022; Nichifor et al., 2021). Tonder et al. assert that addressing these internal organizational factors is pivotal in

driving innovation through digital transformation, highlighting a disconnect between recognizing the need for transformation and executing strategic initiatives effectively (Tonder et al., 2023).

In light of these obstacles, SMEs are adopting various strategies to navigate their unique challenges during the digital adoption process. This often involves leveraging existing human resources more effectively, fostering a culture that embraces digital innovation, and prioritizing a gradual implementation of technologies that align with their business models rather than pursuing radical changes (Priyono et al., 2020)Sidabutar & Siswanto, 2024). For instance, Mattos et al. argue that SMEs need to systematically evaluate their technological assimilation processes and devise tailored approaches that reflect their specific contexts (Mattos et al., 2023). Similarly, evidence from Priyono et al. indicates that the path to digital transformation can be incremental, allowing SMEs to adapt without overextending their capacities (Priyono et al., 2020).

Furthermore, theoretical frameworks such as the Technology-Organization-Environment (TOE) model provide valuable insights into how SMEs can strategize their digital transformation initiatives. This model emphasizes the interplay between technological, organizational, and external environmental factors, which are integral to understanding SMEs' adoption processes (Nguyen et al., 2022). Nguyen et al. highlight that the ability to orchestrate resources effectively can mediate the relationship between strategic vision and actual digital transformation outcomes (Cheng et al., 2023). Understanding these dynamics is crucial for stakeholders involved in supporting SME growth through digital initiatives, as there is a pressing need for tailored programs that address the specific barriers these enterprises face (Wang, 2024).

In conclusion, while the digital transformation of SMEs presents notable advantages, the multifaceted barriers they encounter underscore the importance of targeted strategies that consider their unique contexts. By fostering an inclusive environment for discussing digital challenges and cultivating adaptive practices, SMEs can better position themselves to thrive in an increasingly digital economy. The significance of this research lies in its potential to inform both practical applications and policy-level approaches aimed at supporting SMEs in their digital journeys, ultimately contributing to more resilient and innovative economic landscapes.

Digital transformation has asserted itself as a pivotal element within contemporary organizational discourse, particularly regarding Small and Medium Enterprises (SMEs). Broadly defined, digital transformation entails integrating digital technologies into various aspects of business operations, ultimately yielding substantial improvements in performance and value creation. For SMEs, this transformation marks a pronounced shift from traditional operational models to digital systems, utilizing data, automation, connectivity, and platforms for enhanced efficiency and competitiveness (Martins, 2022; Azevedo & Almeida, 2021). Unlike larger firms, which may navigate structured digital transformation roadmaps, SMEs typically face unique challenges shaped by resource constraints, their entrepreneurial orientation, and informal decision-making processes (Dörr et al., 2023). Thus, to conceptualize digital transformation within SMEs, it is crucial to consider their diversity in size, sector, capability, and organizational maturity.

Research highlights several critical dimensions that characterize the digital transformation journey of SMEs. Firstly, digital technologies—including cloud computing, customer relationship management (CRM) systems, and analytics tools—serve as crucial enablers of change (Priyono et al., 2020; Wang et al., 2023). Secondly, the development of digital capabilities is essential, involving the necessary skills, knowledge, and competencies required to effectively deploy and maintain technological innovations (Krajčík et al., 2023; Shin et al., 2023). Lastly, establishing a digital mindset and culture, which promotes leadership orientation toward innovation and an openness to change, is vital for successful transformation (Shah et al., 2023; Shin et al., 2023). These dimensions are interrelated, suggesting that successful digital transformation is not solely technology-driven but is also significantly influenced by human and organizational factors, as emphasized by Wang (Wang, 2024). SME characteristics such as agility and closer customer relationships can aid in accelerating transformation, yet limitations concerning access to capital, skilled workforce, and formal strategic frameworks may act as impediments.

Various drivers compel SMEs to pursue digital transformation in response to evolving market dynamics and competitive challenges. Foremost among these drivers is the increasing competitive pressure, necessitating enhanced customer engagement through personalized services and improved responsiveness (Mushtaq et al., 2024). Additionally, operational efficiency emerges as a significant motivator; by leveraging automation and data-driven insights, SMEs can reduce costs and optimize workflows, thus enhancing overall productivity (Wang, 2024)Priyono et al., 2020). Digital transformation also fosters innovation, allowing for the development of novel products, services, and business models that can thrive in volatile environments, as demonstrated during the COVID-19 pandemic (Sidabutar & Siswanto, 2024; Mushtaq et al., 2024). Beyond individual firm benefits, digital

JISMA
JOURNAL OF INFORMATION SYSTEMS AND MANAGEMENT
Vol. 04 No. 06 (2025) https://jisma.org e-ISSN: 2829-6591

transformation can contribute to broader socio-economic outcomes, such as financial inclusion and rural-urban economic integration, particularly in developing economies (Wang, 2024).

Despite the compelling drivers behind digital transformation, SMEs invariably confront substantial barriers in implementing these initiatives. These challenges encompass technological limitations—including inadequate infrastructure and cybersecurity concerns—and organizational barriers related to lack of strategic planning and informal management practices (Dörr et al., 2023). Human resource challenges also play a critical role; many leaders in SMEs possess domain expertise but lack robust digital literacy, impeding effective decision-making (Krajčík et al., 2023; . Moreover, financial constraints often serve as a significant obstacle, as limited profit margins hinder investment in advanced digital solutions (Priyono et al., 2020; Wang et al., 2023). Environmental barriers, such as regulatory uncertainties and socio-cultural resistance to change, further complicate the digital transition for SMEs (Martins, 2022; Dörr et al., 2023).

In navigating these barriers, SMEs employ various strategies to facilitate effective digital transformation. Incremental adoption, wherein companies gradually introduce digital technologies, is one effective strategy, enabling SMEs to manage risk and social change cognizantly (Dörr et al., 2023). Leadership commitment is another critical factor, where the involvement of proactive leaders helps mobilize resources and promote a culture of innovation within organizations (Priyono et al., 2020). By enhancing capabilities through training and partnerships with technology providers and industry associations, SMEs can improve their digital readiness and access critical support (Krajčík et al., 2023; Shin et al., 2023). Collaborative ecosystems, wherein SMEs leverage networks for knowledge and resource sharing, have shown promise in overcoming contextual challenges (Wang, 2024). Finally, aligning digital strategies with business objectives ensures that transformation initiatives are relevant and sustainable, reinforcing the importance of contextualization.

As the landscape of digital transformation research evolves, gaps remain, particularly concerning the need for qualitative insights that capture the nuanced experiences of SMEs as they undertake this transition. Much existing literature is quantitative, focusing predominantly on metrics such as adoption rates and performance indicators, thus failing to address the diverse contextual factors influencing the process. Additionally, the frameworks developed from studies in advanced economies require reevaluation for relevance in developing contexts (Azevedo & Almeida, 2021; Priyono et al., 2020). Understanding the socio-cultural dimensions of digitalization, including factors like trust and leadership behaviors, is paramount to comprehending the complex dynamics of digital transformation within SMEs. This study aims to bridge these gaps through in-depth qualitative inquiry, thereby enhancing the understanding of SMEs' digital journeys.

II. RESEARCH METHOD

Research Design

This research employed a qualitative research design to delve into the complex, context-dependent experiences of Small and Medium Enterprises (SMEs) undergoing digital transformation. Qualitative inquiry is particularly conducive to capturing the depth and dynamism inherent in organizational change, facilitating an understanding of meanings and practices that are not easily quantified. Given that technology adoption in SMEs is deeply influenced by socio-cultural, managerial, and technological factors, this research design allows for the flexibility and interpretive sensitivity essential to grasp nuances within these multilayered phenomena (Aji & Priyono, 2021).

To investigate these intricate processes, a multiple-case study approach was adopted, following Yin's (2018) recommendation for examining contemporary processes in real-life contexts, particularly when the boundaries between phenomena and their environments are blurred. This methodology allowed for a comparative analysis of different SME environments, enhancing the depth and richness of findings by exploring both commonalities and variations in digital adoption experiences (Kraft et al., 2022).

Research Context and Participants

The study was conducted among SMEs from various sectors, including retail, hospitality, manufacturing, and digital services. This purposive selection aimed to capture a variety of digital transformation trajectories and associated organizational challenges. Participants comprised SME owners, managers, and key employees directly involved in digital initiatives. Purposive sampling was utilized to ensure the inclusion of individuals with rich experiential knowledge, complemented by snowball sampling to identify additional participants with relevant insights. In total, the study involved between 12 and 20 informants, balancing breadth and depth of perspectives

reflective of diverse socio-economic environments, resource constraints, and varying technological readiness levels (Kallmuenzer et al., 2024).

Data Collection Techniques

Data collection involved three complementary techniques: in-depth semi-structured interviews, participant observation, and document analysis. Semi-structured interviews facilitated exploration of participants' experiences and perceptions while affording flexibility to probe emerging themes. Typically, interviews lasted 60-90 minutes and were conducted either face-to-face or through online platforms, depending on participant availability (Dewi et al., 2022). Participant observation during site visits allowed researchers to witness digital tools in action, analyze employee interactions, and assess workflow adaptations. Field notes were maintained to document observations comprehensively. Document analysis included reviewing internal documents, such as digital strategy reports, training materials, and usage logs, adding layers of context to the collected data (Kouam, 2025).

Research Instruments

The primary research instrument was a semi-structured interview protocol designed to guide discussions on themes such as digital readiness, adoption processes, organizational challenges, leadership responses, human resource dynamics, and perceived benefits or constraints. Open-ended questions enabled participants to narrate their experiences freely, with follow-up prompts facilitating deeper exploration. Observation checklists were used to systematically document the implementation of digital tools and employee engagement. Throughout the study, analytic memos and reflexive journals were maintained to capture emerging insights and document researcher reflections (Martins, 2022).

Data Analysis

Data analysis followed Braun and Clarke's (2019) thematic analysis framework, which offers a systematic but flexible approach suited to qualitative inquiry. The analysis involved six phases: familiarization with data, initial coding, theme development, theme review, theme definition, and report production. Interview transcripts, field notes, and documents were manually coded using an inductive approach, allowing themes to emerge organically from the data. Cross-case comparisons were conducted to facilitate the identification of convergent and divergent themes across different SME sectors (Ahmad, 2024; Brodeur et al., 2021). Member checking was also implemented, sharing summary themes with selected participants to confirm the accuracy of interpretations (Trstenjak et al., 2022).

Trustworthiness and Rigor

To ensure the study's credibility, transferability, dependability, and confirmability, various strategies were employed. Credibility was enhanced through data triangulation, prolonged engagement with participants, and member checking. Transferability was addressed by providing rich, thick descriptions of the research contexts and participant narratives, allowing readers to assess the applicability of findings to similar environments. Dependability was reinforced through a detailed audit trail documenting all methodological decisions, coding processes, and analytical procedures. Confirmability was ensured by maintaining reflexive journals to capture researcher biases and decision-making processes throughout the inquiry (Dubey & Ranjan, 2024).

Ethical Considerations

Ethical integrity was prioritized during the research process. Prior to data collection, ethical approval was obtained from the relevant institutional review board. Participants were informed about the study's objectives, procedures, and potential risks, with written informed consent secured from all involved. Confidentiality was rigorously maintained by anonymizing participant identities and organizational details. All interview recordings and transcripts were securely stored and accessible only to the research team. Participants retained the right to withdraw from the study at any point without penalty, reflecting the researchers' commitment to ethical mindfulness during interactions (Costa et al., 2023).

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III. RESULTS AND DISCUSSION

Theme 1: Technological and Financial Constraints

The interviews highlighted technological and financial constraints as major obstacles faced by participating SMEs during their digital transformation. Many companies reported operating with outdated hardware, unstable internet connectivity, and insufficient access to appropriately scaled software solutions. Participants frequently indicated that available digital solutions were often either overly complex or cost-prohibitive, contributing to a disconnect between vendor offerings and the needs of smaller enterprises (Šimberová et al., 2022). Such challenges resonate with findings from Priyono et al., which noted that SMEs in developing economies encounter systemic barriers related to both digital infrastructure and financial capital (Priyono et al., 2020).

Furthermore, participants expressed significant difficulties in securing funding for digital initiatives due to restricted cash flows and limited access to credit, compounded by a general risk aversion among owners. The high upfront costs associated with digital solutions and ongoing maintenance requirements led many SMEs to adopt cautious, incremental transformation strategies rather than pursuing comprehensive solutions. This interplay between limited financial resources and technological limitations severely impacts the pace and scope of digital adoption among SMEs (Tonder et al., 2023).

Theme 2: Organizational Readiness and Human Resource Capability

Another discernible theme in the findings is the significance of organizational readiness and human resource capability in shaping digital transformation outcomes. Many SMEs exhibited informal organizational structures, limited documentation, and heavy reliance on tacit knowledge that hindered consistent implementation of digital innovations. Leadership, particularly the digital literacy of SME owners and managers, played a pivotal role in determining readiness; those lacking a clear digital vision often hesitated in decision-making and implementation processes (Teng et al., 2022).

Additionally, human resource capability was identified as crucial; employees often lacked the necessary digital skills to efficiently use new systems. Training programs were scarce, particularly for SMEs that operated on tight budgets. Concerns regarding job displacement and increased performance demands further contributed to resistance among employees to embracing new technologies. This aligns with broader literature suggesting that human capital limitations often represent significant barriers to adoption compared to technological deficiencies alone (Peng et al., 2022).

Theme 3: Implementation Strategies and Adaptation Processes

Despite the numerous challenges, SMEs demonstrated remarkable resilience and adaptability in navigating the digital transformation landscape. A common strategy employed was incremental adoption. Many SMEs began their digital journeys by integrating basic tools like messaging applications and digital payment systems, gradually advancing to more sophisticated technologies such as inventory management systems and customer relationship management platforms. This strategic approach enabled firms to mitigate risks and enhance resource allocation while promoting employee learning (Lei et al., 2022).

Leadership-driven initiatives emerged as critical for fostering this transformation. Leaders who championed digital initiatives could inspire employees, allocate necessary training resources, and cultivate an experimental culture. Collaborations with technology providers, community organizations, and governmental programs facilitated access to training, advisory services, and financial assistance, reducing knowledge barriers and supporting technology acquisition (Zhang et al., 2022). Furthermore, SMEs exhibited adaptability by customizing digital tools to better fit their specific operational contexts, rather than rigidly following vendor-defined workflows. This flexibility elicited a more successful integration of digital solutions within existing processes.

Integrative Discussion

The findings collectively illustrate that digital transformation in SMEs is not merely a linear technological transition but involves a dynamic interplay of structural, human, and contextual factors. While technological and financial constraints pose significant hindrances, organizational readiness and human resource capability more decisively shape the success of transformation initiatives. The influence of leadership on these factors is paramount, dictating not just strategic orientations but also employee engagement and resource distribution (Krajčík et al., 2023).

Moreover, the study's insights contribute to frameworks such as the Technology-Organization-Environment (TOE) model, underscoring the profound effects of financial and human capital limitations in emerging market SMEs compared to their counterparts in advanced economies (Raimo et al., 2021). Similarly, findings reinforce the Resource-Based View (RBV) by highlighting that achieving digital transformation does not solely depend on tangible resources like infrastructure but equally on intangible assets such as organizational culture and relational networks (Raji et al., 2024).

SME strategies involving incremental adoption, capability building, collaborative ecosystems, and contextual customization reflect an adaptive capacity intrinsic to digital maturity. Such practices highlight the capability of SMEs to not only adopt but also reshape technology according to their business models and client needs. This perspective challenges deterministic views that see SMEs as merely constrained by structural limitations, revealing instead that strategic adaptation and collaboration can enable significant advancements (Omrani et al., 2024).

Overall, the study emphasizes the necessity of understanding digital transformation in SMEs through a comprehensive, context-sensitive framework. By revealing how SMEs navigate barriers and develop adaptive strategies, the research enriches the understanding of socio-organizational processes influential in driving digital change. These insights hold significant implications for scholars refining theoretical models, practitioners aiming to bolster SME digital readiness, and policymakers crafting inclusive digital development initiatives.

IV. CONCLUSION

Summary of Key Findings

This study reveals that the digital transformation process within Small and Medium Enterprises (SMEs) is influenced by a complex interplay of technological, financial, organizational, and human resource factors. Key challenges include technological obsolescence and financial constraints, which limit SMEs' abilities to adopt advanced digital tools. Conversely, organizational readiness and employee capability emerge as essential determinants of successful digital transformation. Despite these inherent challenges, SMEs demonstrate resilience through several strategies, including incremental adoption of technology, collaborative partnerships, and contextual adaptation of digital solutions to align with their unique operational needs and environments.

Theoretical Contributions

The findings of this study extend established frameworks like the Technology–Organization–Environment (TOE) model and the Resource-Based View (RBV). They underscore the impact of human capital, leadership orientation, and resource limitations on digital transformation in emerging-market SMEs. This research contributes to a burgeoning body of qualitative literature emphasizing that digital transformation is an iterative, socio-organizational process rather than merely a technology-driven endeavor. The study elucidates how these frameworks can accommodate the nuanced realities of SMEs, especially in contexts with varying resource environments.

Practical Implications

For practitioners, the outcomes emphasize the necessity for targeted capability-building initiatives, leadership development programs, and the creation of affordable digital solutions tailored specifically to the operational realities of SMEs. Policymakers are encouraged to fortify digital support ecosystems, expand access to financing, and design inclusive interventions aimed at addressing infrastructural and resource disparities that disproportionately impact SMEs. This could include offering grants, subsidized training, and developing partnerships between SMEs and technology providers to ensure adequate support systems for digital adaptation.

Suggestions for Future Research

Future research endeavors should consider employing longitudinal or mixed-method approaches to track the evolution of SME digital maturity over time. Comparative studies across different regions or industry sectors within developing economies would provide valuable insights into distinct digital transformation strategies. Additionally, examining the role of organizational culture, leadership practices, and digital competency in fostering an environment conducive to digital transformation would enhance our understanding of the factors that enable successful transitions.

In conclusion, this study contributes essential insights into the intricacies of digital transformation within SMEs, revealing how contextual factors shape their digital journeys and emphasizing the importance of adaptive strategies in overcoming barriers to technological adoption.

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