

Difficulties, Focus and Path of Digital Transformation in the Key Period of Small and Medium-sized Enterprise

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Abstract:

This study examines 1,049 small and medium-sized enterprises (SMEs) surveyed through a two-year team-based field research initiative, aiming to identify challenges, focal points, and pathways for their digital transformation. Employing research analysis and textual analysis methods, the study reveals that many SMEs are currently in a critical phase of digital transformation, as evidenced by policy documents and current business conditions. The research data also highlights existing difficulties and obstacles in SME digitalization. Furthermore, it clarifies the focal points of digital transformation from three perspectives: mindset transformation, data transformation, and capability transformation. Finally, based on these challenges and focal points, the study proposes targeted recommendations at three levels—enterprise, industrial system, and government—to help SMEs transition from “following” to “leading” in digital transformation.

Keywords:

SMEs, Digital Transformation, Transformation Challenges, Transformation Focus

1. Introduction

As a vital component of the real economy, the digital transformation of small and medium-sized enterprises (SMEs) serves as both an essential requirement for advancing new industrialization and a key pathway to achieving specialized, refined, distinctive, and innovative development. In 2022, the report to the 20th National Congress of the Communist Party of China explicitly called for “accelerating the development of the digital economy” and emphasized the crucial role of SMEs in high-quality economic growth. Subsequently, policy support has been continuously strengthened: In 2024, four departments including the Ministry of Industry and Information Technology issued the “Special Action Plan for Digital Empowerment of SMEs (2025-2027)” to systematically promote digital transformation among SMEs. The 2025 Government Work Report further highlighted the need to enhance support for SME transformation, helping them overcome developmental challenges, seize

opportunities from technological changes, thereby boosting competitiveness and driving high-quality economic development.

However, compared to large enterprises, small and medium-sized enterprises (SMEs) face significant challenges in their transformation process. On one hand, the initial investment is substantial, uncertainties and risks are high, and the return cycle is long, posing a test to their survival capabilities. On the other hand, traditional business models often exhibit fragmented systems and isolated data, while digital transformation itself is a complex systemic project requiring enterprises to develop highly tailored development paths, further increasing the difficulty of transformation. Particularly under economic downturn pressures, the transformation dilemmas of SMEs become more pronounced: outdated management concepts lead to “reluctance to transform”; concerns about costs and risks result in “hesitancy to transform”; insufficient reserves of talent, capital, and other resources, coupled with a lack of technical integration and application capabilities, cause “inability to transform.” These factors collectively contribute to the overall sluggishness of the transformation process.

Nevertheless, accelerating the digital transformation of small and medium-sized enterprises (SMEs) is a core measure to align with the trends of technological revolution and industrial transformation, and to promote the deep integration of the digital economy and the real economy. To this end, the state has issued a series of specialized policy documents to continuously guide SMEs through the critical period of transformation. Under this context, in-depth exploration of the challenges, pathways, and feasible solutions for their transformation is of significant practical importance for helping enterprises break through bottlenecks, achieve the transition from “following” to “leading,” and thereby support the construction of “Digital China” and high-quality economic development.

2. Literature Review

2.1. Research on Challenges in Digital Transformation for SMEs

Small and medium-sized enterprises (SMEs) encounter multiple challenges during digital transformation, with existing research primarily identifying three key obstacles: talent, funding, and technology. First, the talent challenge. Digital transformation for SMEs involves not just technology adoption but also the deep restructuring of intangible assets like employee skills [1]. Second, the funding challenge. SMEs face dual pressures of internal and external capital constraints and investment risks [2]. Third, the technology challenge. At the technical level, SMEs face dual challenges of technological applicability and implementation difficulties, including the challenge of accurately identifying and selecting technology systems that align with their business needs [3].

2.2. Research on Focus of Digital Transformation of SMEs

To address these challenges, research focus has gradually shifted from internal corporate operations to external ecosystem networks, exploring how to leverage multi-stakeholder collaboration for breakthroughs. First, in strategic planning, scholars propose utilizing external forces to resolve top-level design challenges [4]. Second, regarding financial support, studies emphasize collaborative approaches to alleviate financing constraints and examine the impact of government fiscal support on SME competitiveness [5]. Third, in technology implementation, addressing

practical needs and solving specific technical challenges has become crucial [6]. Fourth, in talent acquisition, exploring diverse pathways to tackle talent shortages represents a key direction. Notably, research perspectives are expanding from individual enterprises to broader ecosystem networks encompassing supply chains and industrial chains [7].

2.3. Research on Digital Transformation Pathways for SMEs

In exploring transformation pathways, existing literature primarily proposes countermeasures from two levels: government and enterprises. First, at the governmental level, current research mainly offers policy recommendations from two aspects: macro guidance and market regulation. Regarding macro guidance, studies emphasize guiding enterprises to participate in formulating core technical standards for the national digital economy [8]. For market regulation, research focuses on addressing critical market failures such as the shortage of digital talent [9] to optimize the external environment for digital transformation. Second, at the enterprise level, relevant studies concentrate on two key actions: building internal consensus and innovating technological applications. In terms of internal management, research highlights the necessity of strengthening organizational consensus for transformation [10] to lay the foundation for change. Regarding technological practices, scholars advocate that enterprises should actively utilize digital technologies to drive innovation in core processes such as production, operations, and decision-making, thereby boosting corporate value growth.

3. Realistic Difficulties: Analysis of Transformation Challenges During the Critical Period of Digital Transformation for SMEs

3.1. Analysis of Transformation Challenges Based on the Digital Transformation Maturity Model

To thoroughly analyze the diverse challenges faced by small and medium-sized enterprises (SMEs) in digital transformation, this study develops a maturity model based on their digitalization progress, structured into four distinct phases. The breakdown is as follows: Phase 1 (Passive Follow-up) accounts for 51% of enterprises; Phase 2 (Active Observation) represents 28%; Phase 3 (Proactive Challenge) comprises 12%; and Phase 4 (Masterful Execution) makes up 9%.

The first stage accounts for the highest proportion, where enterprises passively respond to digital demands without strategic or technological investments. In the second stage, companies begin tactical digitalization attempts with limited technology adoption. The third stage sees enterprises formulate short-term digital strategies and establish preliminary technical roadmaps. By the fourth stage, firms develop innovation strategies, fully implement digital technologies, and prioritize talent development. Overall, most small and medium-sized enterprises (SMEs) remain in the early stages of digital transformation, making passive digital efforts, while only a minority achieve advanced digital capabilities.

3.2. Strategy: Unclear Transformation Strategy and Insufficient Endogenous Driving Force

First, management lacks clarity on ROI and shows wavering commitment to transformation. Over half of SME leaders report difficulties in quantifying digitalization ROI, trapped in a “doubtful and incompetent” dilemma regarding

strategic decisions. On one hand, digital investments lack measurable returns—77% of enterprises lack evaluation systems to gauge actual benefits, causing decision-makers to adopt a wait-and-see approach. On the other hand, strategic direction remains uncertain: SMEs face resource constraints, lack successful case studies and policy guidance, and management doubts transformation pathways. Second, passive transformation prioritizes short-term gains. Nearly 70% of SMEs adopt digital transformation through “passive following,” focusing on short-term projects without systematic strategic planning, which limits sustainable outcomes. On one hand, digital initiatives lack strategic initiative—only 17% incorporate digitalization into three-year plans, while 83% initiate upgrades only when encountering operational pain points. On the other hand, benefit evaluation lags behind transformation cycles: SMEs face the dilemma of balancing short-term survival and long-term transformation, with 89% requiring projects to break even within 12 months while transformation benefits take 3-5 years to materialize.

3.3. Technological Challenges: Barriers to Digital Adoption and Widening Digital Divide

First, technical systems are difficult to customize, leading to persistently high costs. In the digital transformation process of small and medium-sized enterprises (SMEs), standardized construction serves as the foundation for cost control and ensuring effectiveness. Currently, most transformation systems suffer from insufficient standardization, including inadequate modular design by service providers on the supply side and weak standardization foundations among enterprises on the demand side. Firstly, inadequate system standardization drives up implementation costs. There is a scarcity of products in the market that meet SMEs’ needs, while service providers often offer transformation technologies based on large enterprise templates bundled with high-premium modules, increasing transformation costs. Secondly, the lack of standardization generates multiple additional costs. Manufacturing SMEs, due to the absence of unified standards and norms, incur extra expenses equivalent to 35-48% of the total project budget when using digital systems. Additionally, data utilization platforms remain unconnected, hindering collaboration. Although data as a core production factor holds significant value, over 60% of surveyed enterprises face issues such as missing data standards and system coordination difficulties, which constrain the realization of data value. Firstly, internal platforms are fragmented with weak governance capabilities. Most enterprises operate multiple independent digital platforms with low data interoperability, weak data collection, analysis, and application technologies. Secondly, cross-enterprise data flow is obstructed, making collaboration challenging. Some enterprises lack cross-platform data compatibility, business hardware cannot be integrated, and data sharing interfaces are rarely open, all of which hinder digital development.

3.4. Talent Shortage: Digital professionals are in short supply, and digital skills are insufficient

First, there is a shortage of interdisciplinary talents, making it difficult to integrate business and technology. Research shows that small and medium-sized enterprises (SMEs) generally lack interdisciplinary talents, with their digital transformation level only reaching 53% of the industry average. They also face low efficiency in business-technology collaboration. 76% of enterprises identify “communication gaps between technical teams and business departments” as the core bottleneck in transformation,

while 62% of surveyed companies list the shortage of interdisciplinary talents as their top three key challenges. On one hand, technical personnel lack understanding of business scenarios, leading to misalignment between digital solutions and actual needs. On the other hand, even when advanced technical systems are introduced, the lack of interdisciplinary talents makes it difficult for business units to fully grasp the technical value. Secondly, weak employee training willingness hinders the advancement of digital applications. SMEs with low digital talent reserves show low transformation levels, as most employees lack enthusiasm for digital training. 52% of enterprises report “employee resistance to digital tools.” This stems from two factors: employees’ reliance on existing work patterns and uncertainty about new digital technologies, making it hard to step out of their comfort zones; and insufficient training resources and support, coupled with incomplete incentive mechanisms and skill development, resulting in low employee learning motivation.

4. “What to Transform”: Analysis of Transformation Focus in the Critical Period of Digital Transformation for SMEs

4.1. Consciousness Transformation: Focusing on the Perspective of Management Consciousness and Ability

The digital strategy planning by management serves as the core driving force for corporate digital transformation, directly determining its direction, resource allocation, implementation intensity, and ultimate outcomes. Firstly, management in small and medium-sized enterprises (SMEs) acts as the primary driver of digital transformation, holding decisive authority over key issues such as transformation direction, objectives, and resource distribution. If management's digital strategy planning lacks clarity, the company's digital transformation will lack clear direction, leading to chaotic processes and resource wastage. Secondly, through digital strategy planning, enterprises can prioritize digital projects that deliver rapid returns, maximizing efficiency within limited resources. Finally, management's digital strategy planning determines the initiative and long-term nature of transformation. By setting long-term digital transformation goals and developing phased implementation plans, management ensures the company maintains proactivity and continuity throughout the transformation process.

4.2. Data Transformation: Focusing on the Perspective of Interoperability and Integration of Data Information

In the digital transformation journey of SMEs, seamless data interoperability serves as the pivotal enabler. To address data silos, we dismantle departmental barriers and foster cross-functional information flow. For inconsistent standards, we streamline supply chain operations by aligning data across all stages, thereby accelerating data circulation and enabling end-to-end collaboration. Finally, to resolve system incompatibilities, we consolidate fragmented data into a unified platform, eliminating integration bottlenecks and boosting processing efficiency. This empowers SMEs to achieve transformative breakthroughs through data-driven strategies.

4.3. Capability Transformation: Focusing on Employees’ Digital Technology Competence and Training Motivation

Digital technical competencies among employees are pivotal to corporate digital transformation. On one hand, skilled professionals adept at digital tools enhance

operational efficiency, streamline workflows, and provide essential human capital for seamless digital transition. On the other hand, technologically proficient staff better grasp digital potential, proactively explore new technologies' business applications, and shift from passive compliance to innovative leadership. This dynamic drives enterprises to pioneer new business models, optimize processes, and propel digital transformation to deeper levels.

5. “How to Transform”: Policy Recommendations for the Critical Period of Digital Transformation in SMEs

The key findings of this study are as follows: (1) Analysis of transformation challenges reveals that SMEs face three critical issues: unclear strategic direction and insufficient internal motivation in transformation planning; difficulties in implementing digital technologies and widening the digital divide in technological adoption; and shortages of digital talent with inadequate digital skills in workforce development. (2) Focusing on transformation priorities, the study suggests SMEs should prioritize enhancing management awareness and capabilities, improving data interoperability, and boosting employees' digital competencies and training motivation to accelerate digital transformation. Based on these challenges, focal points, and pathways, the paper proposes the following recommendations:

First, enterprises should establish a “focus-driven + transformation-adapted” mechanism to solidify their foundation. For mindset transformation, managers must stay abreast of cutting-edge trends, set phased and measurable strategic goals, and strengthen their resolve. In data transformation, a unified middle platform and standardized architecture should be built to eliminate data silos and enable seamless asset flow. For capability transformation, a customized training system and external talent acquisition channels should be established to cultivate a versatile workforce proficient in both business and technology.

Secondly, at the industrial system level, a “tiered advancement + chain collaboration” framework should be established to unleash the potential of industrial clusters. For specialized, refined, distinctive, and innovative SMEs, dedicated funds should be set up to support the digital transformation of core processes, while benchmark cases should be promoted to address concerns about “daring not to transform.” For “little giant” enterprises, the leading role of “chain leaders” should be leveraged to jointly build data and talent sharing platforms, fostering a resilient full industrial chain ecosystem. For specialized industrial clusters, through coordinated park management, intelligent infrastructure should be co-built and shared, creating a virtuous cycle where “individuals drive the whole.”

Finally, the government should establish a “policy incentives + targeted support” model to ensure effectiveness. For strategic challenges, it should enhance publicity and demonstration efforts, using fiscal subsidies and tax incentives to reduce trial-and-error costs. For technical challenges, it should accelerate the development of an inclusive data service system, promote market-oriented allocation of resources, and break down barriers to data circulation. For talent challenges, it should lead the establishment of cross-regional sharing platforms and industry-academia-research mechanisms to achieve precise supply-demand matching. Through comprehensive and targeted empowerment, small and medium-sized enterprises can achieve high-quality and sustainable development in the digital wave.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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