

# **A Case Study on the Transformation of Business Management in Small and Medium-Sized Enterprises in the Digital Economy Era**

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**Abstract:** With the rapid development of information technology, the process of corporate digital transformation has accelerated, profoundly reshaping small and medium-sized enterprises (SMEs) to adjust their business models and enhance competitiveness. Grounded in the context of the digital economy and relevant theories, this study first clarifies the methods of using digitalization to help small and medium-sized enterprises achieve business management transformation. It then analyzes the operational characteristics of traditional management, the state of digital transformation, and internal and external constraints, summarizing three major issues hindering transformation: outdated management thinking and models, insufficient resource supply, and an underdeveloped supporting mechanism. Qingdao Kutesmart is selected as a case study for in-depth analysis, examining its transformation measures and summarizing its achievements, replicable experiences, and existing challenges. The findings guide similar SMEs in their digital transformation and offer references for governments to improve support policies and build industrial ecosystems.

**Keywords:** Digital Economy; Small and Medium-sized Enterprises (SMEs); Operation and Management; Digital Transformation

## **1. Introduction**

### **1.1 Research Background**

Globally, SMEs are vital to economic growth, as they directly drive employment, enhance competitiveness, and foster innovation, serving as a key pillar of national economic development (Gashi, Usaj et al. 2026)<sup>[1]</sup>. Industry survey data indicate that the overall digital penetration rate of SMEs is low, the pace of transformation is

slow, and practical outcomes are limited.

In practice, small and medium-sized enterprises (SMEs) face multiple obstacles in integrating into the digital economic system, including rigid traditional management models, insufficient data-driven capabilities, a shortage of talent with both business acumen and digital competence, and limited resource investment. In recent years, the Chinese government has successively introduced development plans related to the digital economy, explicitly calling for the promotion of digital upgrading among SMEs, thereby providing certain policy support for their transformation.

### **1.2 Research Significance**

From a theoretical perspective, this study aims to contribute to the research system concerning the management transformation of small and medium-sized enterprises (SMEs) in the context of the digital economy. Much of the existing research tends to focus primarily on the technological application level, with insufficient attention paid to the management paradigm itself. By elucidating the internal logic of transformation, analyzing practical constraints, and conducting in-depth case studies, this can provide a relatively systematic analytical framework for future research and accumulate some hands-on practical experience.

From a practical perspective, identifying the key constraining factors in the digital transformation of SMEs and developing a suitable set of transformation pathways—such as improving quality and efficiency, and experimenting with new business models—can be highly beneficial for enterprises. The findings of this study may also serve as a reference for optimizing policy supply and enhancing public services.

### **1.3 Literature Review**

#### **1.3.1 International literature review**

Compared to domestic research, international studies on enterprise digital transformation

began earlier and have formed a more mature research system, focusing primarily on three core areas: transformation drivers, practical barriers, and implementation pathways. Some scholars argue that successful transformation requires a dual-pronged approach encompassing the modernization of management models and the greening of strategic direction, emphasizing the gradual nature of managerial transition. Other scholars, from the perspectives of brand reshaping and green innovation, respectively, have demonstrated that small and medium-sized enterprises (SMEs) possess the capability to achieve leapfrog development through proactive change. Although differences exist across national cultural backgrounds (e.g., Australia, Thailand, and India), the conclusions that "management professionalization" and "value orientation (e.g., green, brand)" serve as core elements of transformation are of general significance, providing important references for SMEs in formulating long-term development strategies.

#### 1.3.2 Domestic literature review

Domestic research tends to adopt a practice-oriented approach, focusing on the practical dilemmas encountered by small and medium-sized enterprises (SMEs) during their digital transformation, the underlying mechanisms, and the optimization of transformation strategies. The digital development gaps among Chinese SMEs are significant. In the early stages of transformation, SMEs face considerable cost pressures, while the release of long-term value remains relatively slow. Outdated management mindsets and rigid organizational structures are widely regarded as the fundamental constraints on digital transformation. Some studies have selected typical enterprises as analytical subjects to verify the driving role of the C2M model and data-driven governance in the transformation and upgrading of traditional manufacturing industries. Other research findings have synthesized practical experiences with "intelligent systems plus flat governance." Some scholars have proposed that the internal management system of enterprises should be optimized in terms of decision-making mechanisms, organizational structures, and talent incentives. They also suggest the necessity of building a digital industrial ecosystem and better integrating policy utilization with industrial chain collaboration, so as to enhance

the transformation capabilities of SMEs.

### 1.4 Research Ideas and Methods

#### 1.4.1 Research ideas

This study follows the logical sequence of "theoretical foundation-status quo analysis-case study-countermeasures and suggestions." The introduction section primarily elaborates on the research background and significance, reviews the current state of research both domestically and internationally, and outlines the research ideas and methods. Chapter Two first defines the core concepts, then reviews the relevant theoretical foundations, and subsequently explains how the digital economy enables the transformation of small and medium-sized enterprises (SMEs). It then analyzes the characteristics of traditional management in SMEs, the current status of digital transformation, and the practical constraints they face. A typical enterprise is selected as a case study to specifically examine the outcomes of its transformation practices, the experiences that can be drawn upon, and the unresolved issues. In response to the transformation dilemmas identified above, optimization suggestions are proposed from three perspectives: internal management, resource supply, and external support. Finally, the entire study is summarized, and the research limitations as well as directions for future research are discussed.

#### 1.4.2 Research methods

This study primarily employs three research methods: literature review, case study, and inductive analysis. The literature review method involves a systematic examination of academic literature, policy documents, and industry reports in the fields of digital transformation, management innovation, and organizational change in small and medium-sized enterprises (SMEs) both domestically and internationally. The case study method selects a representative enterprise as the research subject. Information is collected through various channels, including corporate disclosures, industry reports, and academic literature, to conduct an in-depth analysis of the enterprise's specific practices in digital transformation, the outcomes achieved, and the experiential lessons that can be summarized. The inductive analysis method is used to synthesize the traditional management characteristics of SMEs, the current state of their digital transformation, and the difficulties they face. Based on the insights derived from the case

study, targeted optimization strategies are then distilled.

## **2. Concepts and Theoretical Foundations**

### **2.1 Core Concepts**

#### **2.1.1 Small and Medium-sized Enterprises (SMEs)**

Small and medium-sized enterprises (SMEs) refer to businesses that are relatively small in terms of workforce size, operational scale, total assets, and other dimensions, and do not hold a dominant position in industry competition; their classification criteria vary across countries and industries. According to relevant Chinese standards, SMEs constitute a significant proportion of all enterprises, characterized by high numbers, widespread distribution, operational flexibility, and relatively weak risk resilience.

#### **2.1.2 Transformation of operations and management**

Operational management transformation refers to the comprehensive reorganization and restructuring of a company's management philosophy, organizational structure, decision-making mechanisms, business processes, and business model in response to changes in the external environment. Decisions were previously made primarily based on experience; now there is a gradual shift toward data-driven approaches. Management has evolved from hierarchical control structures to a greater emphasis on flat, empowering hierarchies and open collaboration. As these transformations are progressively implemented, a company's operational efficiency, value creation capability, and level of sustainable development should all improve.

#### **2.1.3 Digital transformation**

An increasing number of manufacturing enterprises respond to the trend and positively implement digital transformation. Digital transformation refers to the process of integrating and strategically applying digital technologies to fundamentally reshape how organizations operate, interact with customers, and deliver value (Sennou and Elmouhib 2025)<sup>[2]</sup>. Its essence lies in the deep integration of business processes and technology, and should not be simply equated to purchasing additional technological equipment or upgrading hardware.

## **2.2 Relevant Foundational Theories**

### **2.2.1 Organizational change theory**

The theoretical framework of organizational change consists of three stages: "thawing – transformation–re-freezing." The thawing stage primarily involves dismantling existing management concepts and organizational models. The transformation stage entails introducing new technologies and management mechanisms, followed by a thorough review and restructuring of the organizational architecture and business processes. The re-freezing stage is a consolidation phase following the transformation, aimed at stabilizing the new organizational state to ensure its sustainable operation. This theory holds significant reference value for small and medium-sized enterprises, providing support for overcoming traditional bureaucratic structures and adopting a flat governance approach.

### **2.2.2 Resource-based theory**

The resource-based theory posits that firms are aggregates of resources. According to this theory, a firm's ability to gain a competitive advantage hinges on whether it possesses internal capabilities and resources that are scarce and difficult to replicate, such as talent, technology, data, and management expertise. Small and medium-sized enterprises need to strengthen their capabilities in digital talent, technology, and capital; by progressively transforming technology and data into distinctive resources, they can establish differentiated competitive advantages.

### **2.2.3 Value chain theory**

According to value chain theory, a company's competitive advantage does not stem from a single stage but results from the synergistic optimization of all links within the value chain. Digital transformation plays a pivotal role in breaking down data barriers between these links. Specifically, stages such as R&D, production, supply chain, and sales may previously operate in isolation; however, digitalization enables end-to-end collaboration, optimizes the value chain structure, reduces operational costs, and enhances overall value creation capabilities.

## **2.3 The Enabling Logic of the Digital Economy for Transformation**

The digital economy assists small and medium-sized enterprises in transforming their operational management through four key dimensions: technological integration, data-driven decision-making, organizational restructuring, and ecosystem collaboration.

These elements collectively form a fundamental framework characterized by "technology empowering business operations, data informing strategic decisions, organizational adaptation driving transformation, and ecosystems mitigating risks."

At the technology penetration level, digital technologies are integrated into business and management processes, expanding information channels, saving operating costs, and enhancing total factor productivity (Xiaochuan, Mengmeng et al. 2023)<sup>[3]</sup>; at the data-driving level, internal and external data barriers are broken down, and collection and analysis systems are built to strengthen market prediction and dynamic adjustment capabilities; at the organizational restructuring level, departmental silos are broken down, promoting flatter and more flexible organizations and stimulating employee innovation; at the ecosystem collaboration level, an industrial internet-based shared ecosystem is built to achieve collaborative R&D, production, and marketing across the industrial chain, reducing transformation costs and risks for SMEs.

### **3. Current Status of Operation and Management Transformation in SMEs**

#### **3.1 Characteristics of Traditional Management Operations**

Under the industrial economy era, the traditional management models of small and medium-sized enterprises (SMEs) are generally characterized by rigid patterns, inflexible structures, experience-based decision-making, and business processes are predominantly conducted offline.

At the management level, managers tend to adhere to conventional experiential thinking, lacking data-driven mindsets and innovation awareness. Their understanding of digital transformation remains superficial, merely engaging in superficial endeavors about digital transformation, without truly grasping that the core lies in the restructuring of management paradigms.

With regard to organizational structure, small and medium-sized enterprises generally employ a pyramidal hierarchical framework. Such a structure is often plagued by excessive administrative tiers and low efficiency in cross-departmental collaboration.

Regarding decision-making methods, for many years, management's decision-making has been

reliant upon their industry experience; this is actually merely a summary of past actions, lacking data support and risk assessment mechanisms. Response strategies are often formulated without sufficient scientific rigor.

With respect to business processes, most SMEs continue to use offline, paper-based operational models. Functions such as procurement, production, sales, and finance still depend largely on manual recording, transmission, and verification. Information flows slowly, and resources are implicitly wasted.

#### **3.2 Overall Status of Digital Transformation**

Under the development of the digital economy and the impetus of relevant policies, small and medium-sized enterprises (SMEs) have generally started late in their digital transformation, with overall development levels remaining relatively low and significant disparities existing across regions and industries. Although informatization has become widespread, in-depth transformation remains insufficient. There is a notable misalignment between the willingness to undertake digital transformation and the actual capabilities required to do so.

The level of digital transformation among small and medium-sized enterprises (SMEs) in the eastern coastal region is relatively high, with both the penetration rate and depth of transformation generally surpassing those in the central and western regions. The transformation progress is relatively rapid in the computer, communications, and other electronic equipment manufacturing industries. In contrast, traditional manufacturing sectors lag to some extent; although some enterprises have implemented manufacturing execution systems (MES), the degree of digitalization in production processes remains relatively low.

#### **3.3 Practical Constraints on Transformation**

SMEs' digital transformation faces dual constraints from internal resource gaps and external environmental limitations, resulting in a practical dilemma of weak transformation momentum, insufficient capabilities, and a lack of sustainability.

From an internal constraint perspective, small and medium-sized enterprises (SMEs) commonly operate under conditions of resource scarcity, such as skilled labor shortages and limited financial resources. Digital budgets are

often crowded out by core business activities. Information system construction lacks systematic top-level planning, and internal collaboration management systems remain imperfect (Dinanti, Januarti et al. 2026)<sup>[4]</sup>.

From an external constraint perspective, service provider quality varies, and general-purpose solutions lack adaptability. Data security and privacy protection mechanisms are inadequate. Although various levels of government have introduced numerous digital transformation support policies, SMEs lack professional policy research capabilities and appropriate digital tools to connect with these policies.

#### **4. Major Problems in Operation and Management Transformation**

##### **4.1 Outdated and Rigid Management Concepts and Models**

There exist issues of obsolescence, rigidity, and lag in the current management concepts and models of small and medium-sized enterprises (SMEs), rendering their business management transformation confronted with structural bottlenecks.

The inherent inertia of traditional management thinking, coupled with a lack of innovation and cooperation awareness, not only creates internal collaborative barriers within the organization but also runs counter to the goal of "high-quality development," revealing deep-seated problems that hinder enterprises from adapting to the developmental demands of the new era.

The pyramid-shaped structure induces path dependency, severely impeding organizational transformation toward flattening and collaboration, thereby causing the organization to deviate from the expected trajectory of modern organizational development.

Decision-making is often confined to outdated decision-making philosophies, lacking scientific risk assessment capabilities and a well-established digital support system. This directly leads enterprises to assume excessive risks, adopt aggressive strategies, and struggle to formulate sustainable development plans aligned with long-term interests.

The lack of digital empowerment in business processes gives rise to specific problems such as sluggish responsiveness and poor coordination. Meanwhile, high costs, frequent errors, and disconnected data result in suboptimal performance in agility and precision, making it

difficult for enterprises to remain competitive in modern business competition.

##### **4.2 Insufficient Talent and Financial Resources for Transformation**

SMEs face multidimensional practical constraints in the process of digital transformation, manifested specifically as insufficient talent supply, technology, and funding, which create resistance to their transformation efforts.

The surge in industry demand for talent contrasts with the lagging talent cultivation models in universities, leading to a supply-demand mismatch and a structural talent gap.

SMEs face technology deficiencies and widespread financial shortages in the digital domain, resulting in long-term constraints on project investment and hindering the orderly progress of transformation due to a lack of budget.

##### **4.3 Weak Internal and External Supporting Systems**

Currently, the internal and external supporting safeguard systems faced by SMEs in their digital transformation exhibit pronounced characteristics of fragmentation and inefficiency. There are deficiencies in the internal informationization coordination of SMEs, and imperfect collaboration mechanisms hinder the advancement of new business models, becoming substantial obstacles to the integration and implementation of novel business models.

Lack of external support services leads to weak overall resource integration and coordination capabilities. SMEs are unable to fully utilize external support policies or tap into and absorb high-quality market resources, resulting in a continuous weakening of their overall ability to withstand market fluctuations and transform and upgrade.

#### **5. Case Study of SME Transformation**

##### **5.1 Overview of the Case Company**

Qingdao Kutesmart, formerly known as Red Collar Group, founded in 1995 and headquartered in Jimo, Qingdao, is a benchmark enterprise for digital transformation among SMEs in China. Initially focused on batch production of suits, the company long faced operational challenges such as high inventory and slow capital turnover. In 2003, the company

embarked on digital transformation, establishing a data-driven production philosophy and building a C2M industrial internet platform. It officially rebranded in 2017 and was listed on the Shenzhen Stock Exchange Growth Enterprise Market (GEM) in 2020, recognized as the first listed enterprise in China's C2M apparel smart customization sector. Its current main businesses include intelligent manufacturing, customized solutions, and digital governance, achieving "one pattern per person, delivery in seven days" for mass personalized customization, disrupting the traditional batch production model of the apparel industry.

## **5.2 Specific Transformation Practices**

### **5.2.1 Mass personalized customization and supply-demand chain flattening innovation under the C2M model**

In response to the structural pain points of traditional garment manufacturing—namely, high inventory levels, low gross margins, and sluggish responsiveness to personalized demand—the company has carried out a clear and powerful business model reconstruction. The company has proposed a value proposition centered on "mass customization," breaking through the constraints of standardized batch production that characterized the industrial era. By leveraging a digital platform, the company achieves the personalized fulfillment of "one pattern per person, one garment per design." In terms of supply-demand relationships, the company directly adopts a C2M (Customer-to-Manufacturer) connection model, completely eliminating intermediaries such as agents and franchisees, thereby achieving a truly seamless integration between the consumer end and the manufacturing end.

### **5.2.2 Self-developed AGI system and three intelligent agents**

The core measure for enterprises to build their technological foundation is the independent development of the Kute AGI enterprise-level operating system to replace traditional ERP systems. This system breaks down data barriers across design, production, supply chain, and financial functions, thereby establishing a truly integrated digital foundation. On this basis, three intelligent agents—"Ku Xiaojiang," "Ku Xiaoyi," and "Ku Xiaozhi"—are deployed to automatically parse orders and generate pattern data as well as process data. As a result, the entire workflow becomes data-driven, effectively transforming

manual experience-based decisions into systematic intelligent decisions.

### **5.2.3 Implementation of the "five nos" digital governance**

The company completely broke down the traditional pyramid hierarchy, implementing a flat governance model internally characterized by "no departments, no hierarchy, no approvals, no fixed positions, and no leaders." By building a goal-oriented, task-driven mechanism, work is broken down into standardized "task packages." Employees independently undertake tasks based on data instructions, and the system automatically calculates performance based on task completion. This achieves direct collaboration among all employees around shared goals and completes a cultural shift from "control" to "empowerment."

### **5.2.4 Data standardization and equipment networking**

The enterprise carried out an in-depth, flexible transformation of its production line. By systematically organizing the various processes and multiple parameters involved in garment manufacturing and performing digital modeling, the company established an executable system of process standards. Subsequently, an extensive Internet of Things (IoT) retrofit was applied to hardware equipment—including cutting tables, sewing machines, and hanging systems—enabling seamless interconnection and interoperability among the devices. Through real-time data collection and feedback, production line workers perform standardized operations strictly in accordance with instructions from intelligent terminals. As a result, garments of different styles and sizes can be produced simultaneously on the same production line, enabling the operation of "single-piece flow" and eliminating the cost and time traditionally associated with style changeovers.

## **5.3 Actual Outcomes, Experiences, and Challenges**

### **5.3.1 Actual outcomes**

After more than 20 years of transformation, the company has evolved from a traditional garment factory into a technology company centered on Artificial General Intelligence (AGI). Internally, the company has achieved "zero finished goods inventory" for customized apparel, with a minimum delivery lead time of just seven days. On the business front, the enterprise has independently developed an AGI

enterprise-level operating system. Additionally, the company has established a strategic partnership with Huawei Cloud, completing its transition from a "manufacturing enterprise" to a "platform-ecosystem and AGI technology company." As a result, both the company's valuation and its business nature have undergone fundamental changes.

### 5.3.2 Core experiences

Since 2003, the company has increased its investment in scientific research, standardized business processes, and accumulated digital resources, thereby building its information systems and advancing digital transformation.

In the early stage of transformation, the company dismantled its hierarchical structure and introduced a flat "Five-None" governance model characterized by "no departments, no hierarchies, no approvals, no fixed positions, and no traditional leadership." It replaced rule by human judgment with a data-driven "source point theory" approach, and implemented a functional wage system based on task packages. By first adapting the organization to digitalization before formally introducing AGI agents, the company avoided the risk of the system being constrained by outdated processes. The company fully opened the data link between the consumer (C) and manufacturer (M) ends, eliminating intermediary markup links such as agents and franchisees. After successfully validating this model in its own garment business, the company modularized and productized its C2M platform and governance system.

### 5.3.3 Challenges

Given that traditional hierarchy leads to decision-making lags and a general shortage of "digital + business" interdisciplinary talent, the integration of finance and business may increase enterprise information security risks.

Furthermore, weak domestic consumption recovery has led to a downward trend in corporate performance. Expansion activities such as cross-border manufacturing, county-level industrial cluster development, and acquisitions in the fashion industry inevitably bring operational challenges related to cross-regional and cross-cultural management.

Meanwhile, the C2M (Customer-to-Manufacturer) model directly connects consumers with the manufacturing end, enabling a highly responsive supply chain. However, the production model characterized by

small batches and rapid response has made production scheduling and raw material allocation more challenging. Moreover, the unit production cost under this model remains higher than that of traditional mass production. In addition, during the promotion of modular digital solutions, significant variations exist across industries in terms of business processes and digital infrastructure. The high cost of customized adaptation poses considerable difficulties for the standardized implementation of these solutions.

## 6. Countermeasures and Suggestions for Optimizing Transformation

### 6.1 Optimizing the Internal Operation and Management System

In the era of the digital economy, the core task for domestic small and medium-sized enterprises to optimize their internal business management systems is to comprehensively transform from a traditional hierarchical control model to a data-driven governance model. Enterprises need to coordinate and promote upgrading and transformation across multiple dimensions, including mindsets, organizational structure, decision-making mechanisms, and business processes.

To reshape internal management, it is first necessary to clarify the modern development concepts of data empowerment, customer centricity, and innovation orientation. In doing so, the traditional constraints of hierarchical control can be broken through, and the dual goals of employee empowerment and value creation can be effectively advanced. Furthermore, the management should proactively cultivate data-driven thinking and fully recognize that digital transformation is essentially a systemic restructuring of the management paradigm, thereby consciously and proactively accelerating the transformation process.

SMEs should optimize internal structures, adopt flat management, establish clear hierarchical communication to achieve positive organizational performance, combine their own business volume, cut redundant intermediate management levels, and allow grassroots teams to directly connect with the core decision-making level. Simultaneously, they disrupt the intrinsic boundaries of departments, including research and development, sales, and

production. And establish temporary cross-departmental collaboration teams. improve work efficiency, strengthen communication and collaboration among departments, and supplement this with cross-departmental collaboration mechanisms to effectively resolve various obstacles in business communication (Gaur 2026)<sup>[5]</sup>.

A data collection and analysis system covering all business operations should be established, aiming to extract valuable business insights through big data, build predictive models to assist managers in making wiser decisions, and use data mining techniques to identify potential financial risks (Tan and Mao 2025)<sup>[6]</sup>.

Enterprises should proactively and systematically promote the digital upgrading of offline operations. It is therefore advisable to integrate procurement, production, sales, and financial processes into an online management platform, replacing manual operations with intelligent approaches. This will not only facilitate low-carbon development but also better accommodate the increasingly individualized demands of customers.

## **6.2 Addressing Talent and Technology Resource Gaps**

In the context of digital transformation and technology upgrades, SMEs face shortages of highly skilled technical talent and high-quality technology resources. To address these two issues, two corresponding countermeasures are proposed.

Enterprises need to proactively seek ways to break through their development bottlenecks, increase collaboration with universities and vocational colleges, and establish dedicated talent reserves and training bases. This will help align the content of education more closely with the actual needs of enterprises. Such efforts can fundamentally address the issue of talent shortage in the labor market, assist enterprises in recruiting and retaining talent more effectively, and simultaneously enable new employees to adapt more quickly to the demands of the enterprise.

Support should be provided for SMEs to procure technology services and upgrade digital systems in stages, based on their transformation pace and financial capacity, addressing the pain points of high barriers to advanced technology resources and poor adaptability of common resources. This approach aims to achieve new infrastructure

development by promoting digital technology innovation (Shao, Ma et al. 2026)<sup>[7]</sup>.

## **6.3 Improving the External Support Environment for Transformation**

To address the external environmental constraints faced by SMEs in digital transformation, enterprises can overcome external development bottlenecks and improve the external digital development support system through better service selection and policy utilization.

SMEs should select high-quality digital service providers and establish provider access and evaluation mechanisms. To address specific business needs, multiple SMEs can collaborate to jointly procure customized services, sharing costs and alleviating the financial pressure of high customization fees.

It is necessary to establish a normalized policy interpretation mechanism and organize a dedicated working group. This group will systematically compile government policies at all levels regarding support for digital transformation, actively obtain policy information, and narrow the information gap between the government and enterprises. By leveraging professional tools and enhancing policy research capabilities, the group will deeply explore the benefits of relevant policies, fully utilize resources such as financial subsidies, technical support, and talent cultivation, improve the effectiveness of policy implementation, and provide external policy support for digital transformation.

## **7. Conclusion and Outlook**

In the digital economy era, SMEs need digital transformation for rapid development. This transformation is a systematic change involving multiple aspects, not just tech upgrades or equipment replacement. Enterprises should shift from traditional management to data - driven governance, from experience - based to data - driven decision - making, and from closed operations to open, collaborative business. Future research can systematically explore SMEs' digital transformation pathways. Different sectors should be studied separately, and replicable transformation frameworks can be developed to improve research practicality.

Due to research limitations, a multi - dimensional evaluation model covering decision quality, organizational agility, innovation

capability, and green and low - carbon performance should be built. Establishing a scientific assessment system for transformation outcomes is crucial as it can quantify effects and support policy - making.

Moreover, it's necessary to follow the trends of intelligent technologies like large language models and artificial general intelligence. Research should focus on frontier areas such as AI-assisted decision-making and human - machine collaborative management. It is worth exploring the opportunities for transformation and the pathways for realizing changes in the management systems of SMEs during the transition from a digital economy to an intelligent economy. This will enable digital technologies to genuinely promote enterprise development by enhancing total factor productivity, encouraging industrial collaboration and value chain upgrading, and optimizing energy and resource allocation (Sun 2026)<sup>[8]</sup>.

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