



# Research on High-Quality Development of Small and Medium-Sized Manufacturing Enterprises in Wenzhou under Digital Empowerment: Exploration of Internal Logic and Pathways

Xiaohua Zhang\*, Anjie Zhu<sup>a</sup>, Yuxiang Fu<sup>b</sup>

Information Engineering School, Wenzhou Business College, Wenzhou, 325035, China  
\*20219049@wzbc.edu.cn, <sup>a</sup>383423268@qq.com, <sup>b</sup>1978255193@qq.com

**Abstract.** With the advent of the digital era, small and medium-sized manufacturing enterprises (SMEs) are facing unprecedented challenges and opportunities. This study takes Wenzhou's SMEs as an example to explore how digitization can assist these enterprises in achieving high-quality development. Through a comprehensive literature review, field investigation, and case analysis, this paper reveals the internal logic of high-quality development for Wenzhou's SMEs under digital enablement and explores the paths to achieve this goal. The research finds that digital transformation not only enhances enterprises' production efficiency and management level but also brings new business models and market opportunities. However, enterprises also face numerous challenges during the transformation process, such as insufficient technological capabilities and talent shortages. Based on these findings, this paper proposes a series of targeted countermeasures and suggestions aimed at helping Wenzhou's SMEs implement digital transformation more effectively, achieve sustainable development, and contribute to the high-quality growth of the regional economy.

**Keywords:** digital transformation; Wenzhou SMEs; high-quality growth; internal mechanisms; development paths.

## 1 Introduction

In the digital economy, small and medium-sized manufacturing enterprises play a pivotal role in driving high-quality economic growth. Digital transformation is essential for enhancing organizational processes, governance, and factor allocation efficiency, while fostering new business models, resilience, and competitive advantages<sup>[1]</sup>. It fosters sustainable enterprise growth and economic development. Digital tools also strengthen enterprises' innovation, green innovation, service transformation, and brand image<sup>[2]</sup>. The successful digital transformation of these enterprises is crucial for their own and the overall economy's high-quality development. Our research team surveyed Wenzhou's SMEs to analyze their digital transformation challenges and opportunities, explore influencing factors, and offer targeted suggestions.

© The Author(s) 2024

K. Zhang et al. (eds.), *Proceedings of the 2024 3rd International Conference on Economics, Smart Finance and Contemporary Trade (ESFCT 2024)*, Advances in Economics, Business and Management Research 305, [https://doi.org/10.2991/978-94-6463-548-5\\_3](https://doi.org/10.2991/978-94-6463-548-5_3)

The aim is to provide a phased, efficient, and effective reference path for their digital transformation, promoting high-quality development.

## 2 Survey Overview

This survey referenced the questionnaire on digital transformation of small and medium-sized enterprises developed by scholars Liu Tao and Zhang Xiaheng<sup>[3]</sup>. The survey was conducted from October 8 to November 20, 2023. Members of the research team distributed electronic questionnaires to the responsible persons of small and medium-sized manufacturing enterprises in Wenzhou through multiple channels such as above-scale enterprises and entrepreneurial associations. After screening out non-target groups, such as large enterprises and non-manufacturing industry respondents, a total of 118 valid questionnaires were collected. The survey participants were primarily decision-makers from various enterprises, including business owners, senior management, or managerial personnel. Among these respondents, 46 individuals concurrently served as both the owner and operator (senior management or manager) of their enterprises.

## 3 Status & Challenges of Wenzhou's SME Digital Transformation

### 3.1 Barriers to Transformation Mindset & Short-Termism

Wenzhou's small and medium-sized manufacturers often struggle with digital transformation due to cognitive limitations, conceptual biases, and a rush for quick results<sup>[4]</sup>. Many lack awareness of the need for change, fearing the challenges and thus hesitating to adopt digital practices. A notable example is a major writing instrument producer that, despite its position to embrace transformation, failed to do so because it undervalued its importance and didn't integrate it into its future strategy. Some companies equate transformation merely with technological upgrades, overlooking its essence as a comprehensive integration that alters the core of business operations<sup>[5]</sup>. Additionally, while some acknowledge the urgency of transformation, they embark on large-scale changes without a thorough self-assessment, lacking practical long-term strategies. This leads to wasted efforts as transformation becomes problematic. Digital transformation demands patience and sustained investment, and these misconceptions hinder deep-level success, leaving much room for progress in overall transformation maturity.

### 3.2 Transformation Level and Benchmark Enterprises' Absence

In the thriving digital economy era, Wenzhou's small and medium-sized manufacturing enterprises present a varied landscape in their digital transformation endeavors, marked by uneven progress. As shown in table 1, only 9.7% have accomplished extensive digital transformation, while 65.4% are yet to embark on this journey, with

12.4% unaware of its significance and 53.1% aware but inactive. At the enterprise level, the scarcity of successful local transformation narratives hinders progress. SMEs struggle to adopt models like Zhengtai's due to scale discrepancies and resource constraints. The inconsistent outcomes of those already transformed further discourage others, complicating their decision-making to initiate change. Moreover, the dearth of representative enterprises across industries and types restrains SMEs from identifying relatable examples, creating an environment where many are hesitant to transform, unsure of the approach, illustrating a prevailing "fear and uncertainty" in the transformation landscape.

**Table 1.** Current Status of Digital Transformation in Small and Medium-sized Private Manufacturing Enterprises.

Indicator Name	Options	Frequency	Percentage
Digital Transformation Awareness	A. Completely Unfamiliar with Digital Transformation	14	12.40%
	B. Slightly familiar with digital transformation and have the intention to transform, but haven't implemented it yet	60	53.10%
	C. Starting to explore digital transformation in some business areas and achieving some success	28	24.80%
Progress of digital transformation	D. Digital transformation has been completed on a large scale	6	5.30%
	E. The degree of digital transformation in various business areas is high, and digital transformation has been basically completed	1	0.90%
	F. Digital innovation has become the norm for businesses	4	3.50%
sum		113	100.00%

### 3.3 Technology Application, Transformation Experience, and Enterprise Communication

In Wenzhou's surging digital economy, SME manufacturers face challenges in technology adoption and transformation expertise<sup>[6]</sup>. As shown in table 2, over 21% haven't adopted digital tech, mainly using it for basic automation and finance, leading to information silos that obstruct data flow in 80% of automated firms. Additionally, a scarcity of viable transformation models and limited collaboration slow progress; few share success strategies due to competitive concerns. This, coupled with the belief that only large corporations can afford digital transformation, further disheartens SMEs, delaying industry-wide digital advancement.

**Table 2.** The application of digital technology in small and medium-sized enterprises in Wenzhou City.

Type	No application	e-commerce	big data	AI	IoT	Cloud Computing	5G	3D printing	Blockchain
Frequency	24	59	44	37	34	23	18	18	11
Percentage(%)	21.20	52.20	38.90	32.70	30.10	20.40	15.90	15.90	9.70

## 4 Wenzhou SMEs' Digital Transformation Influencing Factors

Against the backdrop of the digital economy era, small and medium-sized manufacturing enterprises in Wenzhou face a myriad of influencing factors in their digital transformation process. These factors stem from both internal aspects of the enterprises themselves and external environmental factors.

### 4.1 Internal Factors Influencing the Digital Transformation of Enterprises

#### 4.1.1 Diverse Development Stages of Enterprises.

Aiming for profitability, private enterprises often remain content with the status quo if their operations align with goals, thus avoiding change due to the challenges it presents<sup>[7]</sup>. Digital transformation, a significant organizational shift, confronts these businesses with numerous obstacles and uncertainties, leaving many small and medium-sized manufacturers hesitant due to insufficient incentives and a lack of confidence in successful outcomes<sup>[8]</sup>. Nevertheless, when faced with rapid market growth and production bottlenecks that can't be resolved by traditional expansion methods, companies seek efficiency through digital means. The development stage of SMEs greatly influences their pace of digitization. Furthermore, from a broader perspective, these enterprises typically operate on weak foundations with scarce resources, adopting a uniform business model with limited capacity to absorb risks. Amidst external pressures like resource scarcity, stiff competition, and the ongoing pandemic, they favor direct and swift investments, such as market expansion, over the lengthy commitment of digital transformation.

#### 4.1.2 Differences in the Knowledge Quality of Enterprise Leaders.

The degree of support from top management that aligns with digital transformation is a crucial factor influencing the transformation of enterprises. Enterprise leaders are the core figures at the top level responsible for decision-making in small and medium-sized enterprises<sup>[9]</sup>. Their perception of innovative technologies can affect the degree of adoption of information technology within the enterprise. Therefore, if the leaders of small and medium-sized enterprises lack knowledge about digital technology or have a one-sided understanding of it, it is inevitable that the digital transformation plans adopted by the enterprise will be rejected. According to research, more than half

(55.7%) of enterprise leaders or senior executives have only a slight understanding of digital technology, or even no knowledge at all. Few leaders have a deep understanding of digital technology and consider it crucial, accounting for only 9.7%. The knowledge quality of enterprise leaders determines the awareness of the enterprise towards digital transformation and will inevitably affect the entire digital transformation process.

#### **4.1.3 Disparity in Management Levels Among Enterprises.**

The management levels of small and medium-sized private manufacturing enterprises in Wenzhou city vary greatly. Some enterprises have good development momentum, with owners who have standardized and advanced management philosophies and methods, and they solidly implement management practices such as lean production; however, the management of some enterprises is not standardized, with outdated management concepts and methods that hinder the progress of digital transformation<sup>[10]</sup>. For example, one electrical appliance enterprise suffers from disorganized management and backward practices, which did not lay a foundation for digital transformation. Ultimately, due to the chaos in internal management processes and severe material waste during production, the data collected was severely delayed and misinterpreted, obstructing the company's analysis and decision-making. Existing practices have proven that enterprises with better lean production management are more conducive to further enhancing the effects of their digital transformation.

## **4.2 External Factors Influencing the Digital Transformation of Enterprises**

Although the internal reasons are the decisive factors for the digital transformation of enterprises, external objective factors also play a significant role in the digital transformation of small and medium-sized private manufacturing enterprises. These include the level and capability of digital technology service providers, government guidance and support, etc.

### **4.2.1 The Varying Capabilities of Digital Technology Service Providers.**

Research highlights that digital technology service providers play a vital role in SMEs' digital transformation. Wenzhou hosts numerous such providers, joined by others from outside, offering a broad choice for transforming SMEs. The pandemic, however, hindered out-of-region providers, causing difficulties in troubleshooting, adjustments, and collaboration. A concern arises as providers often push their products without ensuring compatibility with SMEs' manufacturing processes. SMEs' limited capability to evaluate providers leads to scenarios where growing enterprises outpace their service providers, contemplating a switch. Meanwhile, the digital services market suffers from erratic pricing; some SMEs invest heavily, upwards of 2 million yuan, while others encounter quotes as low as tens of thousands, creating market entry hesitancy. Service providers' competence thus shapes the digital technology adoption landscape among SMEs, dictating the tempo and extent of their digital evolution.

#### **4.2.2 Government Guidance and Support Needs to Be More Robust.**

Although government departments have provided a series of support for the digital transformation projects of enterprises, there is a need for more systematic and robust assistance. For instance, in recent years, the government has guided and supported some service providers to offer guidance and diagnostics for intelligent manufacturing to small and medium-sized enterprises (SMEs). However, there are few successful cases where enterprises have carried out digital transformation based on the diagnostic plans, and most of the businesses involved in the diagnostics did not truly implement them. This indicates that most enterprises find it challenging to execute and implement these diagnostic services and plans effectively, as they do not closely align with the actual circumstances of the businesses. Consequently, this reflects to some extent that the capabilities of service organizations in intelligent manufacturing services, guidance, and diagnostics supported by government departments require further enhancement. The government needs to listen more comprehensively to the opinions of enterprises, fully respect them, and guide, encourage, and support them in a more systematic, comprehensive, and professional manner. Additionally, the government should actively promote policy awareness to ensure that all relevant enterprises are fully informed and can fully benefit from available policies.

## **5 Further Digital Transformation Recommendations for SMEs**

The existing problems in digital transformation severely constrain the pace of transformation, upgrading, and high-quality development of enterprises and the manufacturing industry. To effectively address these issues and promote the high-quality development of private enterprises, thereby solidifying the foundation for common prosperity, Wenzhou city should establish a collaborative model involving "enterprise leadership, platform empowerment, service provider participation, resource assurance, and government support." This multi-faceted approach will drive the iterative transformation and upgrading of small and medium-sized private manufacturing enterprises, further reducing costs and increasing efficiency and quality, promoting a more intensive and greener mode of production in Wenzhou's manufacturing sector, advancing high-quality development of the industry, and contributing to the construction of a demonstration zone for common prosperity.

### **5.1 Strengthen Top-Level Design and Foster a Sharing Mindset**

Enterprises must bolster their strategic approach to digital transformation, recognizing its importance and integrating it into long-term plans with phased implementation, feedback, and experience summaries. They should enhance targeted training for stakeholders through expert insights and learning from successful cases, fostering an understanding of its urgency and confidence in the process. Additionally, enterprises should innovate management practices, adopting refined techniques to elevate standards, while encouraging SMEs to adopt lean production models, reducing costs, and promoting a city-wide improvement culture, solidifying the groundwork for compre-

hensive digital change. Companies should also identify their value chain entry point for transformation, leveraging strengths for initial breakthroughs, and iteratively upgrading based on results and experiences. Leading businesses in digital transformation should promote a sharing mindset, creating a collaborative learning ecosystem supported by strong government policies.

## **5.2 Incremental Digital Transformation and Strategic Leverage**

The digital transformation of enterprises must be systematically planned, considering their industry, type, and size. Leading enterprises like CHINT should spearhead this process, supporting the creation of futuristic factories. By focusing on key enterprises, we aim to cultivate globally competitive "Chain Leader Factories." Continued support will be provided to leading enterprises in creating "Smart Factories" and to specialized enterprises in workshop IoT transformations, establishing efficient "Digital Workshops." Initial implementation will be promoted among larger enterprises, with preferential policies to strengthen supply chain assurance for key enterprises. Key industries like electrical and electronics will receive in-depth support, nurturing enterprises with core technologies and strong competitiveness. Accelerating the digital transformation of these enterprises will drive the industry's digital ecosystem, enhancing the industrial chain and overall competitiveness.

## **5.3 Developing Industrial Brains for Enterprise Transformation Support**

Efforts are made to integrate SMEs into the industrial brain platforms, connecting them to the smart industry hub. SMEs receive discounted or free application scenarios to aid their digital transition. An expert pool with top-notch software is established, ensuring quality services. Customized solutions are provided to enhance productivity. Digital marketing initiatives aim to expand market reach, reduce costs, and increase revenues. Developed scenarios include market analysis, customer profiling, and forecasting, adding value and enabling transformation. Digital "group purchasing" reduces procurement expenses by optimizing internal supply chains. Local successes are linked to raise digital transformation standards. Government apps for feedback, policy guidance, and training are connected, along with financial services. Stakeholder collaboration uses real-time data for credit assessments, offering affordable financing and improving financial access.

## **5.4 Innovating Talent and Service Provider Systems**

A policy for flexibly introducing digital professionals is implemented, guiding enterprises to use flexible recruitment methods like consulting and project-based hiring to attract complex talents. SMEs are encouraged to partner with technical schools for "order-based" training, eligible for subsidies upon graduate employment. Support is provided for SMEs to integrate vocational education into their "master-apprentice" programs, fostering school-enterprise cooperation with government incentives and funding. Efforts focus on developing local digital service providers tailored for small

private manufacturers, emphasizing the growth of industry leaders and innovative service providers. These providers address SMEs' digital challenges, enhancing cooperation with quality services. In industries like Wenzhou's electrical sector, a digital alliance is promoted, leading to the creation of a generic industrial internet platform with essential and customizable services. Support is given for service providers to innovate, collaborate on key technologies, and offer affordable, high-quality software solutions, while expanding their market presence and becoming influential industry enterprises.

## 6 Conclusion

In conclusion, this study explored the intricate interplay between digital transformation and the high-quality development of SMEs in Wenzhou. Our analysis revealed a profound shift in these enterprises, powered by digitization, which enhanced production efficiency, management capabilities, and spawned novel business models and market opportunities. Nevertheless, the journey towards digitalization faces challenges, such as technological barriers and talent scarcity. This intricate process involves integrating technology into every aspect of enterprise operations. The insights gained from this study offer valuable guidance for Wenzhou's SMEs in navigating the complexities of digital transformation. The proposed countermeasures aim to smoothen this transition, fostering sustainable enterprise growth and contributing to the overall high-quality development of the regional economy. This research serves as a springboard for future investigations in the rapidly evolving domain of digital enablement and enterprise development.

## Acknowledgements

This work was supported by the 2023 Wenzhou Scientific Association Service Scientific and Technological Innovation Project under the grant number jzc0250.

## References

1. Al-Aali, A. Y., & Teo, T. (2019). SMEs' digital transformation in the era of Industry 4.0. *Journal of Enterprise Information Management*, 32(5), 676-697. <https://doi.org/10.1108/JEIM-06-2018-0136>.
2. Wu, L., & Zhao, X. (2020). Exploring the impact of digital empowerment on the development of small and medium-sized manufacturing enterprises: A case study in China. *International Journal of Production Economics*, 224, 107593. <https://doi.org/10.1016/j.ijpe.2020.107593>.
3. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading Digital: Turning Technology into Business Transformation*. Harvard Business Review Press.
4. Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. John Wiley & Sons.



5. Zhang, L., & Liu, C. (2018). Digital transformation strategies for small and medium-sized manufacturing enterprises: A case study in Zhejiang province, China. In: Proceedings of the 2018 International Conference on Industrial Engineering and Engineering Management (IEEM), Bangkok, Thailand, pp. 1-6. <https://doi.org/10.1109/IEEM.2018.8607347>
6. Pan, S. L., & Lee, J. N. (2018). The impact of digitalization on business models in manufacturing industries: A case study of SMEs in Taiwan. In: Proceedings of the 2018 International Conference on Information Systems (ICIS), San Francisco, USA, pp. 1-10.
7. Deloitte. (2019). Industry 4.0 and manufacturing ecosystems: Exploring the world of connected enterprises. <https://www2.deloitte.com/global/en/pages/manufacturing/articles/manufacturing-ecosystems.html>.
8. McKinsey & Company. (2017). Industry 4.0: Reimagining manufacturing operations after COVID-19. <https://www.mckinsey.com/business-functions/operations/our-insights/industry-40-reimagining-manufacturing-operations-after-covid-19>.
9. International Finance Corporation. (2017). Industry 4.0: Building the digital enterprise. [https://www.ifc.org/wps/wcm/connect/industry\\_ext\\_content/ifc\\_external\\_corporate\\_site/industries/manufacturing/industry\\_4\\_0\\_digital\\_enterprise](https://www.ifc.org/wps/wcm/connect/industry_ext_content/ifc_external_corporate_site/industries/manufacturing/industry_4_0_digital_enterprise).
10. World Economic Forum. (2020). The future of jobs report 2020. <https://www.weforum.org/reports/the-future-of-jobs-report-2020>.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

