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Literature Review on Enterprise Digital Transformation and Quality-Benefit

Sen Wen

Nanjing Normal University, Nanjing, Jiangsu, China

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Abstract: The digital transformation of enterprises has received attention since the 2010s, but existing research has mostly focused on the macro level, lacking micro empirical analysis and insufficient attention to external factors. The research conclusions on the consequences of digital transformation in the economy are inconsistent, and China's manufacturing industry shows a polarization phenomenon. At the same time, the academic community has not paid enough attention to quality-benefit, especially in the context of digitalization, the theoretical and practical issues of improving the quality-benefit of China's manufacturing industry urgently need to be explored. This article reviews the relevant research on digital transformation and quality-benefit of enterprises, points out shortcomings, and proposes future research directions, aiming to lay the foundation for subsequent research.

1. Introduction

The major achievements and historical experience of China's economic development fully show that a complete, strong and modern manufacturing system has become a solid guarantee for China's economy to forge ahead. The 14th Five-Year Plan clearly states that China will accelerate the development of a strong manufacturing and quality country and promote high-quality development of the manufacturing sector. The 2023 Outline for building China into a quality Power points out that the improvement of China's quality level still lags behind economic and social development, and the foundation for quality development is not solid enough. We must shift the focus of development to quality-benefit. At present, China is in the outbreak period of a new round of scientific and technological revolution. According to the Research Report on the Development of China's Digital Economy, the scale of China's digital economy will reach 50.2 trillion yuan in 2022, accounting for 41.5% of China's GDP. Digital transformation has become an important driving force for promoting Chinese-type modernization. The rapid integration of digital technology and the real economy provides a strategic opportunity to solve the long-standing problem of low quality-benefit in China's manufacturing industry. Therefore, this paper will review the existing research results of digital transformation and quality-benefit respectively, in order to lay a foundation for

further research on exploring how enterprise digital transformation can improve the quality-benefit of Chinese manufacturing enterprises.

2. A review of research on enterprise digital transformation

2.1 Definition of enterprise digital transformation

In terms of the research on the definition of the connotation of digital transformation, the relevant research has experienced the development process of "technology combination → improved entity → enterprise reconstruction → cross-system transformation" (Zhao and Fan, 2022). Meng and Zhao (2018) believed that enterprise digital transformation refers to the integration of digital technology and traditional industrial technology, and the digital management of manufacturing process, so as to improve the efficiency of resource allocation. When Vial (2019) used semantic analysis method to sort out the concepts of existing literature on digital transformation, he found that there were some problems in the definition of enterprise digital transformation in many literature, such as unclear terminology, circular argument, confusing concepts and their impacts. According to his research results, he proposed the definition of digital transformation as "the process of triggering significant changes and changing entities through the combination of information, computing, communication and connection technologies". Wu et al. (2021) pointed out that Vial's (2019) definition of enterprise digital transformation also has some vague points, such as failing to clearly define the concepts of "entity", "process" and "triggering major change", and failing to fully describe the scope and results of enterprise digital transformation and clearly distinguish "information transformation" from "digital transformation". Wu et al. (2021) defined enterprise digital transformation as "the process in which an enterprise reconstructs products and services, business processes, organizational structures, business models and cooperation models through the combination of information, computing, communication and connection technologies in the process of digital transformation, aiming at designing enterprise business activities more effectively, so as to help enterprises create and capture more value". Based on the existing literature, it can be found that although scholars have defined the digital transformation of enterprises from different perspectives, its essence has something in common: to systematically reshape the existing industrial management mode through the introduction of digital technology, and promote the transformation of enterprise management mode from "industrialization" to "digitalization", so as to enhance competitive advantage (Liu et al., 2021).

2.2 The influencing factors of enterprise digital transformation

The academic circle has carried out extensive discussion on the influencing factors of enterprise digital transformation. This paper summarizes them into internal and external influencing factors for sorting and analyzing. The internal influencing factors mainly include: (1) technological innovation. Technological innovation is an important guarantee for enterprises to improve the output-input ratio (Kong, 2012), and the progress of digital technology is the premise of enterprises' digital transformation and the source of enterprises' efficiency improvement (Loebbecke and Picot, 2015). Therefore, the progress of digital technology fundamentally impacts the process of enterprises' digital transformation. (2) Digital strategic vision and leadership. Digitally literate leaders are critical to understanding technology trends and helping organizations prepare for digital disruption (Zhao and Fan, 2022; Li et al., 2021). Under the leadership of innovative entrepreneurship, enterprises will actively explore the use of digital technology to strengthen resource integration and reorganization, promote resource development and expand resource utilization channels. (3)Resources and capabilities. Digital transformation requires large

investments in technology, infrastructure, talent and training, which are long-term and unpredictable, and carry large sunk costs (Usai et al. 2021). For smes with scarce resources and digital capabilities, on the one hand, digital transformation requires the government to provide "precision drip irrigation" financial support (Liu, 2021), and on the other hand, enterprises need to make full use of and integrate into the "cloud" platform established by digital service providers to reduce the cost of digital transformation (Qi and Cai 2020). (4)Organizational structure and culture. Guo et al. (2021) conducted a double case study on Haier and Suning from an ecological perspective, and the results show that the core driving force for the opportunity development of digital transformation is the formation of symbiotic relationship, which is driven by the outward-oriented organizational culture, entrepreneurial leadership and customer orientation. Li et al.(2023), based on the Myles-Snow strategic type analysis framework, used the fsQCA method to study the single champion enterprises in China's manufacturing industry, and found that there are four types of digital innovation adaptation configurations that can produce high enterprise performance. Enterprises should build appropriate digital innovation strategy models according to the external environment and internal resources and capabilities. This shows that adjusting the organizational structure and cultivating a culture that embraces change, collaboration and data-driven decision-making is another important factor for the implementation of enterprise digital transformation. The external influencing factors mainly include: (1)policy support and support. Government policies and initiatives play a vital role in promoting digital transformation in all walks of life. Targeted policies that promote digital application, encourage investment in digital infrastructure, and provide financial support for enterprises engaged in digital transformation can accelerate the pace of digitalization (Wu et al., 2021; Wu et al., 2021), and this acceleration effect will not only act on the enterprises themselves that are encouraged by the policy, but also generate digital transformation spillover effects along the supply chain, accelerating the digital transformation process of upstream and downstream enterprises (Cai et al., 2023). (2)Market environment and consumption mode. With the rapid development of digital technology and the change of consumer behavior habits, consumers increasingly hope to meet different kinds of needs in a one-stop and seamless way, and promote the transformation of business ecology from individual competition of "independent" to ecosystem competition of "win-win cooperation" mode (Chen et al., 2020). Similarly, the transformation of digital technology has blurred the boundary between manufacturing enterprises and other entities, and promoted the value creation of traditional enterprises to shift from commodity-dominated logic to service-dominated logic (Vargo, 2020). This means that the market environment in the digital context is highly dynamic, showing the characteristics of rapid technological progress, changes in consumer preferences and fierce competition. (3)External stakeholders. The embeddedness of an enterprise in its social network is an important manifestation of the inter-organizational connection, which determines the economy and innovation ability of the enterprise (Owen-Smith and Powell, 2004). In addition, the deeper an enterprise is embedded in the group, the stronger the impact of the digital transformation of other enterprises in the group is (Pan et al., 2022; Zhang and Du, 2023; Du et al., 2023).

2.3 Consequences of corporate digital transformation

Digital transformation and its consequences have become the focus of academic attention.Some studies show that digital transformation can promote enterprise innovation and management paradigm change, and bring positive effects to enterprises: Research on organizational strategy and business model shows that digital transformation promotes the transformation of traditional business logic, and promotes business management from enabling to enabling (Chenet al., 2020). The application of digital technologies such as Internet, Internet of Things, cloud computing,

artificial intelligence and blockchain promotes the transformation of enterprise decision-making paradigm and enabling innovation (Chen et al., 2020). Related research on finance and finance shows that digital transformation can significantly improve the performance of enterprises in the capital market and improve stock liquidity (Wu et al., 2021); Research on operation and organizational structure shows that digital transformation can significantly improve the level of enterprise servitization, and bring profitability improvement and value appreciation (Zhao, 2021); Research on output efficiency and performance shows that digital transformation can improve manufacturing productivity (Huang et al., 2019), and improve enterprise performance by improving supply chain integration and professional division of labor (Zhang and Duan, 2023). However, some studies have pointed out that the implementation of digital transformation requires a large amount of continuous investment in precipitation costs, which may crowd out production resources (Usaiet al., 2021). In addition, the problem of difficult integration of digital technology with original resources and existing businesses in the process of digital transformation further increases the uncertainty of digital transformation benefits (Liu et al., 2021).

3. A review of research on quality and benefits

3.1 Definition of quality effectiveness

In the stage of rapid growth, scale and quantity are the most prominent features of economic development, and the lack of supply leads to the benefit mainly driven by quantity. At this time, the exchange value of products and the use value can be assumed to have a positive correlation, that is, the "quantity-quality" symmetry (Jin Bei, 2018). However, with the liberation and development of productive forces, the supply side presents structural saturation, the marginal benefit generated by quantity decreases, and the improvement of quality-benefit becomes the foothold for enterprises to maintain their core competitiveness. There is little literature on quality-benefit as the research topic. Yang Youhong (2021) believes that quality-benefit are promoted by quality improvement, while Guan Xiaoguang and Ge Zhijie(2000) believe that the concept of quality-benefit has inherent fuzzy attributes, which is formed by the coupling of quality and economic efficiency.

3.2 The influencing factors of quality-benefit

Guan Xiaoguang and Ge Zhijie (2000) believed that quality-benefit are affected by six quality factors, namely performance, life, reliability, safety, economy and user satisfaction of products or services, and benefit factors investigated from three aspects: producer, consumer and society.

From the perspective of the influencing factors of quality, Garvin (1984) believed that the connotation of quality is very rich, including the objective characteristics of products, social characteristics formed by word-of-mouth, advertising, history and other factors, as well as some psychological and visual satisfaction obtained by consumers from products. Some studies have paid less attention to the issue of "quality", and mostly focused on the field of international trade research. On the one hand, these studies use industry or product data to measure quality, so they fail to pay attention to quality issues at the enterprise level. For example, the unit value method assumes that brand premium, supply and demand relationship have no difference in the impact on product price, and the market performance quantity method assumes that consumer psychology, marketing ability and so on have no difference in the performance of product market, which leads to a certain deviation in the quality benefit measurement. In recent years, based on the theoretical framework of new New trade, researchers in the field of international trade have studied the decision-making mechanism and influencing factors of export product quality at the enterprise level, showing that product quality is endogenously determined in three aspects: enterprise production efficiency, fixed

input efficiency and market size (Shi and Shao, 2014).

From the perspective of the influencing factors of benefits, benefits include economic benefits and non-economic benefits. Among them, economic benefit refers to the interpersonal market relationship in the social and economic process of enterprise activities, which can be defined as the ratio of the cost of price evaluation to the result of price evaluation, and its source is productivity (Liu, 2014). The main influencing factors are profit rate, asset-liability ratio and other financial indicators. Non-economic benefit refers to the output generated in the process of enterprise activities that is not directly evaluated by price and is conducive to the improvement of overall social welfare. It emphasizes that the development of enterprises should not only focus on the economic level, but also consider the ecological environment, corporate culture, corporate system, sustainable development ability and so on.

3.3 The measurement of quality-benefit

Most of the existing literature discusses the quality-benefit as an integral part of the high-quality development system or the quality power evaluation system. Specifically, it is measured from six sub-indexes, namely, export product recall notification index, number of world-famous brands owned by domestic manufacturing industry, value added rate of manufacturing industry, labor productivity of all employees in manufacturing industry, competitive advantage index of high-tech products trade, and profit margin of sales. Then, the "expert scoring method" is used to assign weights to each index and sum it up to obtain the high-quality development indexof corresponding dimensions. Quality-benefit is considered to be the most important dimension in the construction of manufacturing power. The results of international comparative analysis of major industrialized countries by using this evaluation index system show that there is still a big gap between China's manufacturing power index and that of the United States, Japan, Germany and other major industrial countries, especially in the quality-benefit there is a big shortage. Based on the evaluation system of "manufacturing power", Zhu Gaofeng (2017) further analyzed the development of China's manufacturing industry from the vertical development context, and believed that the main reasons for the low quality-benefit of China's manufacturing industry include poor industrial foundation, weak quality standard system, weak innovation and non-standard market. Du etal. (2020), on the basis of sorting out the scientific connotation of China's industrial high-quality development, combined with the practical difficulties of industrial development, constructed an evaluation system of industrial high-quality development from five primary indicators: innovation-driven, green transformation, collaborative development, open development and quality-benefit. Quality-benefit includes three sub-indicators: development quality, development power and development efficiency. Among them, development quality is measured by "labor productivity of industrial enterprises under constant price rules" and "total factor productivity of industrial enterprises under constant price rules", and development power is measured by "real growth rate of industrial added value under constant price rules". Development efficiency is measured by four sub-indexes: "average net profit of industrial enterprises", "total profit rate of industrial enterprises", "asset-liability ratio of industrial enterprises" and "profit rate of cost and expense of industrial enterprises".Finally, the entropy weight Topsis analysis method is used to add up the weights of each index. Pan et al. (2019) included quality-benefit as the primary index when constructing the evaluation index system and comprehensive index for the transformation and upgrading of China's manufacturing industry, and measured it from four indicators: labor productivity, high-tech products trade competitive advantage index, the proportion of capital-intensive industries, and the proportion of technology-intensive industries.

4. Conclusion

Since the digital transformation of enterprises was proposed in the 1910s, it has gradually become a hot topic of common concern in the business and academic circles. However, the existing research mainly focuses on the meso industrial economic research and the macro national economic research level, and most of the research is theoretical exposition, lacking the empirical analysis at the micro enterprise level. When sorting out the influencing factors of enterprise digital transformation, it can be found that this major strategic decision is widely affected by a variety of internal and external factors of the enterprise. However, the existing research focuses on the internal factors, less attention is paid to the external factors, especially the close interest connection and interaction with the upstream and downstream enterprises of the supply chain. In addition, there are differences in research conclusions on the economic consequences of digital transformation: Some studies believe that digital transformation can improve the efficiency and benefits of enterprises, while other studies point out that it may lead to increased costs and risks. The practical observation of China's manufacturing industry also confirms this polarization phenomenon -- some enterprises achieve "take-off" with the help of digital transformation, while most small and medium-sized manufacturing enterprises are stuck in "bog". Therefore, how to reduce the cost and risk of digital transformation and play the role of digital technology in the transformation of production and operation mode to improve the quality-benefit of enterprises has become an urgent problem to be solved, which may need to focus on the radiation effect of external stakeholders (especially upstream and downstream enterprises in the supply chain). Quality is the core of international market competition as the way to rejuvenate a country, make a country rich and make a country strong. However, the academic circle still pays insufficient attention to quality-benefit, especially the theoretical and practical issues of improving the quality-benefit of China's manufacturing industry under the background of digitalization need to be explored urgently: (1) Although some scholars have defined the connotation of quality-benefit in manufacturing industry, they mostly focus on the industrial level and lack the quality-benefit evaluation system at the enterprise level combined with the characteristics of digital transformation. Analyzing the connotation of quality-benefit from the micro perspective combined with the characteristics of digital transformation is helpful to reveal its generation mechanism; (2) Among the many factors affecting the quality-benefit of manufacturing industry, data, as a key production factor, is very important to improve the quality-benefit, so it is particularly necessary to systematically analyze the generation mechanism of quality-benefit enabled by digitalization; (3) Although previous studies have emphasized the importance of digitalization in quality management, there is still a need for in-depth research on how to play the internal and external capabilities of enterprises to drive the role of digital transformation in the improvement of quality-benefit.

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