



Research on the Path of Digital Transformation of Chinese Manufacturing Enterprises Under the Backdrop of High-Quality Development

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Abstract. The development of the digital economy has given Chinese companies great opportunities to achieve high-quality development. At the same time, due to the weak foundation of digital transformation in Chinese enterprises, the degree of industrialization and information integration needs to be deepened, the shortage of talent in digital transformation is serious, and the pattern of collaborative innovation in the industrial chain has not been formed, the digital transformation of Chinese manufacturing enterprises has brought challenges. In this paper, on the basis of field investigation and literature research to design the enterprise digital transition process and theoretical framework, put forward the top design, the accumulation of data resources, speed up the digital platform, optimizing organization structure, build a benign collaborative ecological system under the background of development of high quality digital transformation and path for the development of manufacturing enterprises in our country.

Keywords: High-Quality Development · Manufacturing Enterprises · Digital Transformation

1 Introduction

The “14th Five-Year Plan” proposed to “give full play to the advantages of massive data and rich application scenarios, promote the deep integration of digital technology and the real economy, enable the transformation and upgrading of traditional industries, foster new industries, new forms, and models of business, and strengthen new engines of economic development”. The Notice issued by the Ministry of Industry and Information Technology on the Three-Year Action Plan for the Development of New Data Centers (2021–2023) also clearly pointed out that “within three years, the development pattern of new data centers with reasonable layout, advanced technology, green and low carbon, and the scale of computing power to adapt to the growth of digital economy will be basically formed.” In recent years, despite the severe impact of COVID-19 on the global economy and the sharp downturn in some economies, China’s digital economy has bucked the trend and shown great vitality. According to the White Paper on The Development of

China's Digital Economy (2021) released by the China Academy of Information and Communication technology, the scale of China's digital economy will become the second in the world in 2020, reaching 39.2 trillion yuan, accounting for 38.6% of GDP. The digital economy has grown at least three times faster than GDP, becoming a key driver of stable economic growth.

In 1995, the concept of digital economy was first published by Don Tapscott, a Canadian, in his book *Digital Economy*: Unlike the old economy, where information was analogous or physical, he argues that in the new economy, knowledge is stored in digital form, and information in digital form flows freely around the world at the fastest speed with the help of devices. Data show that 34.54% of enterprises in China have started to implement a digital transformation strategy, of which 15.9% are fully promoting digital transformation, while 18.64% only carry out digital transformation in some departments or products. 18.83% of enterprises are planning to start a digital transformation [16]. The rise of the digital economy has profoundly changed the traditional economic model and economic system [25]. In the era of the digital economy, the only way to achieve high-quality economic development is to accelerate the process of digital industrialization and industrial digitization and promote the deep integration of the digital economy and the real economy [28].

2 Review of the Research Literature

About the Concept of Digital Transformation. From the technical perspective, digital technology refers to the technology that converts all kinds of information such as pictures, texts, audio and video into binary digits "0" and "1" that can be recognized by computers with the help of certain equipment, and then stores and processes them [1]. Digitization is the action, process and development process of digital technology application [2]. The digital transformation of enterprises refers to the process of triggering significant changes in organizational characteristics and reconstructing organizational structure, behavior, and operation system through the combined application of information technology, computing technology, communication technology, and connection technology [3]. According to the G20 Digital Economy Development and Cooperation Initiative adopted at the 2016 G20 Hangzhou Summit, the digital economy is defined as the digital economy refers to a series of economic activities in which digital knowledge and information are used as key factors of production, the modern information network is an important carrier, and the effective use of information and communication technology is an important driving force for improving efficiency and optimizing economic structure.

In the Digital Transformation of Enterprise Development. Digital transformation is an important path for manufacturing companies to realize innovation today. The digital transformation of manufacturing enterprises will help improve their performance in new product development, expand new development space, and promote demand-centered business concepts, models, and formats [4]. Currently, environmental uncertainty has become the normal development of organizations, while promoting organizational innovation is the key to deal with environmental uncertainty. The capability of big data has a

positive effect on innovation performance. Enterprises transform from experience-based product R&D to data-driven product R&D. It is closely related to the promotion of three external driving factors, namely, breakthrough innovation in technology, major change in the competitive environment, and consumer empowerment [5]. China's traditional manufacturing industry faces a structural contradiction between "insufficient supply" of high-end customized production capacity and "serious excess" of low-end manufacturing capacity. Through digital empowerment, enterprises not only establish a direct communication bridge with end customers and accurately obtain real-time information of customer needs, but also provide timely and accurate data input for product R&D and design, so that users can enjoy more convenient and efficient life-cycle services [6]. Digital strategy giving, shared digital strategy giving, digital business strategy giving, and the realization of digital business strategy are the four kinds of digital transformation that support enterprise transformation [7]. The digital transformation of our country enterprise exists the transformation ratio is low, unbalanced development problems such as insufficient [8], digital transformation of enterprises belong to the management practice of new phenomenon, digital transformation of enterprises is a dynamic process, the digital components, infrastructure, and digital platform is the support condition of enterprise digital transformation [9], enterprise management decision makers should deep personnel characteristics and essential demand for the development of the digital transformation, see digital transition is the iterative upgrade of the enterprise strategy, with digital and systematic thinking, promote enterprise resources, business facilities, and digital elements, and through feedback from the digital result and run a test to examine the mechanism of enterprise digital effects [10].

In Terms of Methods and Paths of Enterprise Digital Transformation. The digital transition of the manufacturing enterprise surrounding from two dimensions of the inner driving force and the external force is divided into two logical lines, the longitudinal and transverse longitudinal logical lines refer to the "technology push", including the transverse technology driving force and the vertical force, and the lateral logical line refers to the "value drivers", including the value of customer experience and the value of process optimization. Build the logical framework for the digital transformation of manufacturing enterprises from internal and external dimensions. In the era of digital economy, the enterprise digital transformation is to realize intelligent transformation relying on 5G, big data and network technology. The path is to strengthen digital technology innovation and business application, to construct a business process that is digital in connotation, to realize digital innovation of products and services closely related to core business, to control mode with highly coupling of components and a digital service system, and to construct an intelligent strategy and organizational culture of the enterprise. The success of enterprise digital transformation needs two important factors, one is effective technical support conditions, the other is able to provide necessary financial resources for digital transformation [11].

3 Digital Transformation of Manufacturing: Basic Connotation and Core Characteristics

3.1 Basic Connotation of Enterprise Digital Transformation

Digital technology refers to products or services embedded in or supported by ICTs, including digital components, digital platforms, and digital infrastructure [12]. Digital transformation refers to the process in which enterprises respond to environmental changes by using digital technologies to change value creation. The digital transformation is divided into three stages. Digital transformation, digital upgrade, and digital transformation, Digital transformation is a high-level transformation aimed at creating a dynamic Digital business model by developing Digital technologies and supporting capabilities on the basis of Digitization and Digitalization. The three distinguish differences by emphasizing digitalization in information, process, and business, to build a new business model and stimulate the new core competitiveness of enterprises [13].

The digital transformation and management of enterprises is a strategic choice adopted by enterprises to adapt to the development of the digital era, enabling radical transformation of organizations based on the innovative application of data technology. From the perspective of organizational change, enterprise digital transformation is the process of using digital technology to transform the core products, services, and processes of enterprises [14]. Digital transformation refers to the process of innovation of companies that use digital technologies to adapt to the highly changing digital environment by reshaping corporate vision, strategy, organizational structure, processes, capabilities, and culture. The ‘Digital transformation’ of companies refers to the transformation process in which companies apply digital technology to reduce repetitive labor or replace traditional digital technology with advanced digital technology in the process of production, operation, and service. Digital transformation is a re-recognition of organizational structure or development strategy by an organization or enterprise based on digital technology. In this process, digital technology becomes the main force driving the transformation and upgrading of organizations or enterprises.

The digital transformation of manufacturing industry is the deepening and application of the “technology-economy” paradigm change in the field of manufacturing, and the fundamental transformation of modern information technology on the factor structure, mode of production, organizational structure, and value source of manufacturing industry. The digital transformation of the manufacturing industry is a breakthrough in cluster innovation of modern information technology and its deep integration with the manufacturing industry. It is an all-round transformation of R&D, design, production and manufacturing, storage and logistics, sales and service of manufacturing industry driven by data elements.

3.2 Core Features of Digital Transformation of Manufacturing Enterprises

Digital transformation prompts organizations to iterate on resources, capabilities, and models and form new inertia [15]. The antecedents of digital transformation are based on two aspects: external technology and internal value. Through the input of digital transformation (I), including the internal elements of the enterprise (including digital awareness, technical resources, organizational resources, human resources, learning ability,

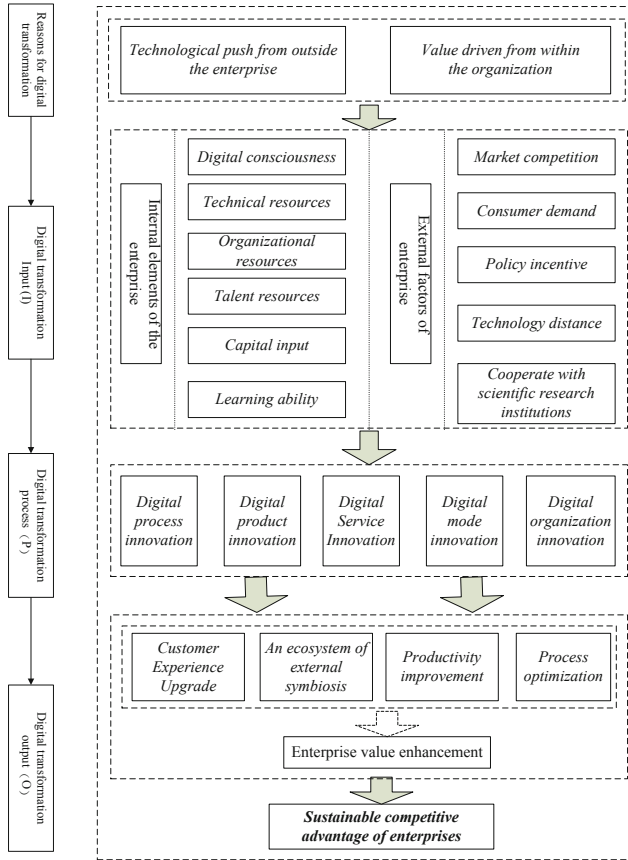


Fig. 1. Digital Transformation Process of Enterprises and Theoretical Framework

capital investment, etc.) and the external elements of the enterprise (market competition, consumer demand, government policy incentives, technological distance, external cooperation, etc.), Digital product innovation, process innovation, digital service of the digital mode innovation, digital organization innovation, innovation in five aspects of digital transformation (P), process optimization, customer experience to upgrade, collaborative symbiotic ecology system, promote the digital transformation of the output efficiency (O), finally achieve the enterprise value promotion and obtain sustainable competitive advantage. The ultimate goal of enterprise digital transformation is to reach the channel between consumer demand and production enterprises, improve enterprise production efficiency, realize enterprise innovation and development, and increase customer value [16] (Fig. 1).

4 The Dilemma of Digital Transformation of China's Manufacturing Industry

4.1 The Pattern of Collaborative Innovation in the Industrial Chain Has Not Yet Been Formed

The prominent contradiction of the development of China's digital economy is that production relations lag behind and restrict the development of productive forces. The digital transformation of Chinese enterprises requires collaborative innovation in many different fields, such as cooperation between enterprises and universities and research institutes, which can fully integrate the superior resources of both sides and better realize the transformation goals. For the most part is the actual situation of the current enterprise does not pay attention to the cooperation with scientific research institutions such as colleges and universities, prefer to believe in yourself, a lot of enterprises and research institutions cooperation only becomes a mere formality, did not play a greater role, scientific research institutions cannot be or the not timely transformation of achievements, the innovation of the enterprise, and lacking a cutting-edge thinking, It is difficult to realize the effective supply of digital transformation system solutions.

4.2 The Foundation of Digital Transformation is Weak

Small and medium-sized enterprises in our country the digital transformation of the basic level is generally not high, according to data shows that there are more than half of the companies never to digital transition, don't know about nearly a quarter of the small and medium enterprises digital transformation, almost a third of the enterprise to the transformation of digital know slightly, willing to digital transformation, but has not yet started, Only 4.39% of enterprises have basically completed digital transformation. It can be seen that although digital transformation can bring value appreciation and improve competitive advantage for enterprises, the foundation of transformation is quite weak.

4.3 The Integration of Industrialization and It Needs to Be Further Deepened

The essence of informatization that affects the efficiency of industrial innovation is that information technology penetrates into each link of the industrial innovation value chain, improves the innovation efficiency of each link, and thus realizes the overall improvement of the efficiency of industrial innovation, that is, the integration of informatization and industrialization (integration of industrialization and informatization) affects the efficiency of industrial innovation. However, China's innovation output is characterized by low quality, unbalanced structure, generally low transfer efficiency, large but not strong industry as a whole, low-end oversupply, high-end supply is insufficient, product quality needs to be improved, lack of leading enterprises with international influence and other prominent problems.

Given that the level of information infrastructure is higher, the two combination of the greater role in promoting efficiency in industrial innovation, the government should supplement the traditional short board on the basis of the information infrastructure,

accelerate the 5 g base stations, big data, Internet industry, infrastructure construction in the field of artificial intelligence, and so on, for the fusion of industrialization and information, smart upgrade, digital transformation to create conditions [17].

4.4 Serious Shortage of Talents in Digital Transformation

Failure to fully understand the necessity of digital transformation is one of the key reasons for the difficulties and even failures of digital transformation in manufacturing enterprises. The essence of this problem is the insufficient development of talent and the professional reserve of companies. As the concept of digital economy comes from abroad, it has not emerged for a long time in China, and there are not many professionals in digital economy or digital transformation. Although in recent years, universities and colleges in China have established digital economy majors and even digital economy colleges, it takes time to cultivate professional talents and cannot be accomplished overnight. A large number of enterprises still know little about the concept of digital economy and digital transformation and cannot hold corresponding courses and training, resulting in weak talent training ability and lack of talents to support enterprise digital transformation, affecting all links of the entire enterprise digital transformation.

5 The Path of Digital Transformation of Chinese Manufacturing Enterprises

5.1 Accelerating Top-Level Design with Policy Guidance

Among the external factors of digital transformation, policy support is a subjective factor, and the government should strengthen policy guidance and support for manufacturing enterprises. In the digital era, the government should actively guide and assist companies in the realization of digital transformation, promote the deepening of the division of labor, and improve the economic efficiency of companies. In the national new infrastructure strategy, efforts will be intensified to build infrastructure for the digital economy, and commercial use and coverage of 5G and WIFI6 will be accelerated. At present, China's efforts to build new infrastructure related to the digital economy are seriously insufficient. Less than 20% of the new 900 billion local special bonds in 2020 will go to digital economy-related infrastructure. While increasing investment in digital infrastructure, the government can diversify its use of new infrastructure to strengthen the digital transformation of existing factories and enterprises.

5.2 Investment in R&D and Accumulation of Data Resources

Whether it is a general manufacturing company or a technology company, R&D investment is the key to enterprise development. In fierce market competition, only by increasing investment in research and development, mining data resources with products and customer service as the core, promoting digital transformation, and developing new distinctive products can we win the favor of consumers and win the market. As enterprises invest in R&D and produce new products with high added value to market, they can not

only obtain objective corporate benefits but also attract more investors, open up more financing channels, build a diversified financial organization system, further promote digital transformation, and improve international competitive advantages.

5.3 Talent Training and Building a Platform for Digital Transformation

The competition of a country is the competition of talents, and the development and growth of an enterprise depends more on talents. New Internet technology, information, big data, the Internet of things and other aspects of the construction of all rely on talent to promote. In the current process of digital transformation, talents are the first resource, and enterprises need to supplement the shortage of talents by introducing digital talents from outside and cultivating digital talents from inside.

5.4 Management Reform, Optimize the Organizational Structure

The implementation of digital strategy is not only a matter for the technical department but also for the transformation of the organizational structure and management mode of the enterprise, from the head of the enterprise to the ordinary employees, from ideological awareness to practical action, including organizational culture, system form, business model, and functional division of labor. Digital transformation is an all-round, whole-chain, and whole-system transformation. Every link and every post of an enterprise is designed for digital transformation, which requires the joint participation of all employees.

5.5 Collaborative Innovation to Build a Benign Digital Ecosystem

In the process of digital transformation, enterprises can make full use of the scientific research capabilities of universities and research institutes, and also make use of the resource advantages of upstream and downstream enterprises or similar enterprises to form complementarity. In the era of the digital economy, the cooperation mode between enterprises has developed from the upstream and downstream “chain” to the “network” [18]. In today’s increasingly developed commodity economy, it is no longer possible for enterprises to provide customers with satisfactory solutions by relying on the operation mode of going it alone. It is necessary to actively build a benign digital ecological system of value creation shared with other stakeholders (suppliers, customers, partners, etc.). Digital native enterprises and traditional enterprises can complement each other by reshaping production relations, jointly producing customized products, and providing higher value services for customers.

6 Conclusions

The manufacturing industry is the main body of the real economy and is the foundation of building a strong country in China. From 2012 to 2020, the added value of China’s manufacturing industry increased from 16.98 trillion yuan to 26.6 trillion yuan,

accounting for almost 30% of the global total, showing a strong momentum of development and an important position. As China's economy enters the new normal and the global digital economy flourishes, China's manufacturing enterprises are facing many new opportunities and challenges in digital transformation, integration of industrialization and informatization, and coordinated development of industrial chains. The "14th Five-Year Plan" clearly proposed "to promote the deep integration of digital technology and the real economy, enabling the transformation and upgrading of traditional industries" and "to accelerate the digital industrialization and promote the coordinated transformation of the whole industrial chain of data empowerment", which fully reflects the country's high attention and urgent demand for the digital transformation of manufacturing enterprises. We believe that under the guidance of policies, we will continue to increase R&D investment and personnel training, optimize the organizational structure of enterprises, and strengthen the establishment of a synergistic and benign ecological system with relevant upstream and downstream institutions. The success of the digital transformation of companies will surely further promote the high-quality development of the industry.

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