

A research on the transformation and upgrading path of digital economy for manufacturing industry

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Abstract. Digital economy plays a crucial role in the development process of China's national economy. Under the general trend of economic globalization and China's positive business environment, enterprises are competing more and more fiercely in the international and domestic markets and facing more and more challenges. Currently, China is at a critical stage of economic structural transformation, and the digital economy, as a new economic form, provides new opportunities for the transformation and upgrading of the manufacturing industry, and the digital economy has a configuration effect that not only changes the way of knowledge acquisition, but also improves the factor allocation efficiency, which can produce significant economic effects. This paper defines the concept of digital economy, analyzes the 3. important value of digital economy for manufacturing transformation and upgrading, and points out the path of digital economy for manufacturing transformation and upgrading from the dimensions of digital transformation awareness, intelligent production and organizational structure agility.

Keywords: Digital economy; Globalization; Digital transformation; Manufacturing Industry.

1. Introduction

The management level of a manufacturing company determines the overall operational performance of the company and how it can achieve a lasting competitive advantage in the information age. China is a big manufacturing country, but the development of manufacturing industry still faces the lack of management level, and the manufacturing industry is still in the traditional mode and lacks a complete supply chain system. With the emergence of global informationization, Internet of Things, block chain, artificial intelligence and other emerging information, gradually breaking the existing traditional business model, Chinese manufacturing enterprises should strengthen the use of new information, summarize the theory of production system in time, closely track the development and changes of new information, integrate block chain and other emerging technologies, further explore the intelligence of supply chain management system, enhance the competitiveness of suppliers, effectively integrate suppliers, and Improve the strength of enterprise supply chain management.^[1]

2. The concept of digital economy

The digital economy, as a broad concept, can include any economic form that directly or indirectly uses data to direct resources and promote productivity development. At the technology level, it includes big data, cloud computing, Internet of Things, blockchain, artificial intelligence, 5G communication and other emerging technologies. At the application level, "new retail" and "new manufacturing" are typical representatives.

The digital economy covers two major elements: digital industrialization and industrial digitization. Digital industrialization refers to the information and communication industry, including electronic information manufacturing, telecommunications, software and digital services, and the Internet industry, etc. Digital industry refers to the traditional industry benefiting from digital technology to improve production quantity and quality, and on this basis to achieve mutual integration in various fields, resulting in new business models and new patterns. The development of digital economy should take new infrastructure as the core underlying structure, including semiconductor devices, communication facilities and services, software applications and other basic hardware and software; on top of that, various Internet enterprises will build digital application platforms to meet specific

needs of customers in connection with specific application scenarios of enterprises and individuals; in addition, the new output formed by the three traditional industries using digital technology will also constitute an important part of the digital economy. It is the intuitive embodiment of digital empowerment.

2018 U.S. Bureau of Economic Analysis report "Defining and Measuring the Digital Economy" points out that the digital economy is composed of three components, which are related to infrastructure development, e-commerce, and digital media.^[2]

3. The special value of the digital economy for manufacturing

The manufacturing industry is the main body and lifeline of the national economy. The manufacturing supply chain mainly contains four categories, which are the supply side of raw materials and parts, the production side, the sales side and the after-sales service side, involving a very wide range. The manufacturing industry is the main part of the whole industrial chain and supplier system. It interacts with agricultural products, services and other industries externally, and includes many processes from raw materials and intermediate products processing to final products manufacturing and logistics internally. Modern manufacturing industry creates a constant supply of goods and elements for the industrial chain and supply chain system, and creates an indispensable material guarantee for the smooth operation and stable growth of the national economy. With the rapid development of information technology in the manufacturing industry, the market environment is in an era of extremely strong personalized demand, extending to modern manufacturing supply chain management to realize the effective connection of R&D, production, operation and distribution data flow before meeting the needs of agile management.

In the environment of Industry 4.0, data acquisition and analysis technology have also gradually become a major feature of the transformation and development of the manufacturing industry, and the future competition in the manufacturing industry will be in the process of seizing data sources and improving the level of data analysis. Converting basic information into key information is an important issue facing the manufacturing supply chain management process. In order to better promote the quality modernization and management of China's intelligent manufacturing development, in 2021, the National Development and Reform Commission will also successively formulate and implement relevant policy measures, such as the "National Intelligent Manufacturing Standard System Construction Guide (2021 Edition)", "The 14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Outline of Vision 2035" and "National Standardization Development Outline". Under the role of active policy guidance, China's manufacturing industry upgrade and the intelligence of its entire supply chain are in the spotlight, new information technology will be introduced continuously, and the digital economy promoting intelligent manufacturing management will become an inevitable trend.

4. How the digital economy contributes to the transformation of manufacturing

4.1 Digital transformation awareness into manufacturing management concept

Unlike traditional enterprises which mainly focus on attributes such as quantity, quality and price of products, the management of enterprises in digital economy will revolve around users, and the mode of products and services will be centered on the creation and supply of value. Digitalization is not only the use of digital technology to improve efficiency, but also means a change in competitive attributes and a shift in management thinking and paradigm. Only by focusing on meeting the diversified and personalized needs of users and continuously strengthening close collaboration with ecological partners can enterprises seize digital opportunities. Enterprise management should realize the strategic significance of digital thinking, establish digital transformation awareness as early as possible, and fundamentally transform traditional management concepts. Let users effectively and

efficiently participate in production, design and other activities, and give full play to the power of intellectual capital by empowering users and employees.^[3]

4.2 Intelligent production to achieve the transformation of "Made in China" into "Smart Manufacturing in China"

In recent years, breakthroughs in enabling technologies such as artificial intelligence, knowledge engineering and neuronal networks have opened the era of intelligent transformation of manufacturing. Unlike the replacement of human manual labor by machines in digital and networked transformation, intelligent transformation realizes the expansion and replacement of mental labor by machines, which enables machines to have the functions of self-learning, self-perception and self-decision making, forming the new development mode of intelligent manufacturing.

Intelligent production is the integration of advanced manufacturing technology and new generation of information technology, and intelligent transformation of the whole production process based on data, scenarios, algorithms and arithmetic, in order to achieve automatic order taking, machine learning, intelligent decision-making, intelligent scheduling, process monitoring, equipment awareness and other intelligent production methods. Intelligent production was first proposed by the United States in the 1990s, and Germany, Japan, and other industrial countries subsequently developed their own intelligent manufacturing development plans. Intelligent production has evolved from digital production and networked production, and has completed the evolution from process control to Internet of everything to intelligent manufacturing. Intelligent production can save time, land and labor costs, reduce energy consumption, improve the quantity, quality and technical content of products, increase the added value of the entire industrial chain, especially the manufacturing chain, raise and flatten the "smile curve", and promote the upgrading of the manufacturing industry.

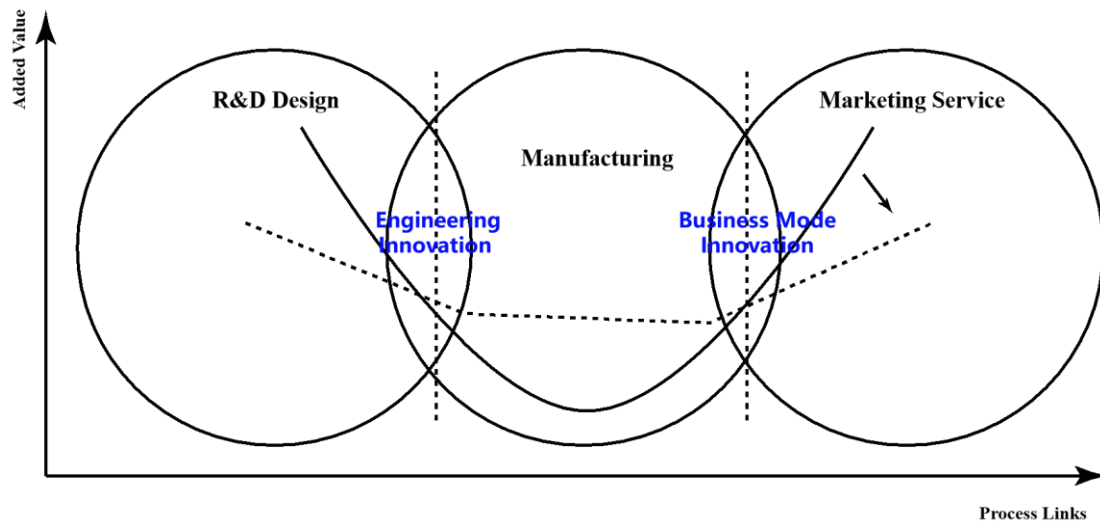


Figure 1: The change of “smile curve” of manufacturing industry under the background of intelligent manufacturing^[4]

With the development of "intelligent manufacturing", each link in the value chain will create value together, deliver value together and share value together. In this way, "Internet + industry" will make a disruptive reshaping of the value chain of manufacturing "smile curve". Personalized customization gives the front-end R & D design to the user; the user directly places orders to the enterprise, which also weakens the back-end sales, thus flattening the "smile curve" and reuniting it into a value ring.^[5]

4.3 Agility management of manufacturing organization structure

For manufacturing enterprises, the strategy determines the organizational structure. In the industrialized era, no matter it is a linear system, functional system, linear-functional system or

divisional system or matrix system, the enterprise organization structure is like a pyramid, showing the characteristics of verticalization, section hierarchy and hierarchy, which lacks sufficient flexibility in responding to the changes of external environment and resource allocation. The rapid development of the digital economy has led to a shift in corporate strategy, which also requires companies to innovate their organizational structure and re-coordinate, evaluate and plan the combination of people, money and materials. The strategy of enterprises in the digital economy should focus on pursuing the maximization of enterprise value by enhancing synergy with other enterprises.

5. Conclusion

From the history of the impact of science and technology innovation on social and economic development in the world, we can find that science and technology innovation can play an important driving role. Since the first technological revolution in the 18th century, from the steam engine in Britain to the fifth scientific and technological revolution led by the United States in the 80s and 90s - the industrialization of information and the development of the Internet economy, human society has experienced five "long waves" of science and technology. "Each of them has established the world leadership position of the leading wave countries and brought about a "nuclear fusion" impact on the world economic and social development.

Under the wave of global digital revolution, the widespread application of digital technology has led to tremendous changes in industrial structure and industrial organization, and market competition has become more complex and intense, and enterprises are facing a series of new opportunities and challenges. In the face of the "unprecedented changes" in the economic world, digital transformation and intelligent upgrading have become the obvious choice for all kinds of enterprises in terms of strategic direction. Looking ahead, user value domination has become the fundamental force driving enterprise management change, and digital technology has formed data penetration among enterprises to promote the interconnection of information silos, and enterprises choose to "do the right thing" and pursue enterprise value maximization when formulating strategic directions, which is more in line with the inherent requirements of the digital economy.

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