

# Research on Digital Economy Driving High Quality Development of China's Manufacturing Industry

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**Abstract:** As an important driving force of the new round of scientific and technological revolution and industrial change, the digital economy plays a key role in the high-quality development of China's manufacturing industry. This paper discusses in depth the profound impact of the digital economy on China's manufacturing industry, as well as the transformation and upgrading path of the manufacturing industry in this context. It is found that the digital economy has reshaped the value chain of the manufacturing industry through technological innovation, model innovation and organisational innovation, promoting the improvement of production efficiency and the optimisation of industrial structure. Driven by the digital economy, manufacturing enterprises have actively embraced digital technologies, such as cloud computing, big data, artificial intelligence, etc., which have promoted product personalisation, servicing and networking, and realised the transformation from traditional manufacturing to smart manufacturing. In addition, the digital economy has spawned new growth points and industrial ecosystems, such as the industrial Internet and platform economy, which have further stimulated the innovation vitality of the manufacturing industry. Government policy guidance and support, such as the construction of digital infrastructure, the opening of data resources, and the creation of an innovative environment, have played an important role in promoting this process. However, the digitisation process also involves issues such as data security, privacy protection, and skills gaps, which need to be properly addressed by improving regulations and enhancing education and training. To summarise, the digital economy has opened up new space for the high-quality development of China's manufacturing sector, but it also poses new challenges. Manufacturing enterprises, the government and relevant stakeholders need to work together to seize the opportunities of the digital economy and deal with the complex issues brought about by digital transformation, in order to achieve sustainable and inclusive growth in the manufacturing sector. This will not only help the manufacturing industry to maintain its leading position in global competition, but will also inject a strong impetus into the transformation, upgrading and sustained prosperity of China's economy.

**Keywords:** Digital Economy; Manufacturing; High Quality Development; Smart Manufacturing; Industrial Structure.

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## 1. Introduction

With the rapid development of science and technology and the deep integration of the global economy, the digital economy is reshaping the global industrial structure in an unprecedented way, especially for China's manufacturing industry, which has far-reaching implications. As the cornerstone of China's economy, the improvement of the quality and efficiency of the manufacturing industry is directly related to the competitiveness of the country and the sustainable development of the economy. This chapter aims to illustrate the opportunities and challenges facing China's manufacturing industry in the context of the digital economy, as well as the urgency of high-quality development.

The rise of the digital economy, with data at its core, is deeply transforming the production methods, business models and value chain structure of the manufacturing industry through technological innovation, model innovation and organisational innovation. Data, as a new type of production factor, not only improves the efficiency of resource allocation, but also promotes product and service innovation, providing a new driving force for the high-quality development of the manufacturing industry. The introduction of the digital economy has led to fundamental changes in the production function of the manufacturing industry, and the application of artificial intelligence, big data and other technologies has enabled enterprises to more accurately predict market demand, optimise production processes and improve production efficiency, thus realising the transformation from mass

production to customised and intelligent production.

The transparency and real-time nature of the digital economy reduces transaction costs and improves the accuracy of corporate decision-making, helping enterprises to move up the global value chain. Knowledge innovation has received an unprecedented boost in the digital economy, with open innovation and co-creation mechanisms involving users stimulating the innovative capacity of enterprises, thus supporting their high-quality development. On the other hand, the digital economy has also spawned new growth points, such as the industrial internet and platform economy, and these new industrial forms have brought new profit models and market space to the manufacturing industry, further stimulating the industry's innovation dynamics.

However, the process of digitisation has not been smooth, and issues such as data security, privacy protection and skills gaps have arisen. These issues have put new demands on enterprises' strategic decisions, technological innovation and social policies. Therefore, how to make full use of the opportunities brought by the digital economy while properly addressing these challenges is a key issue that needs to be addressed in the current process of high-quality development of China's manufacturing industry. Government guidance and support, including the construction of digital infrastructure, the opening up of data resources, and the creation of an innovative environment, are crucial to facilitating this process.

This study will explore in detail how the digital economy affects China's manufacturing industry through the above dimensions and provide insights into the transformation and

upgrading path of the manufacturing industry driven by the digital economy. At the same time, we will discuss the role of government policy in this transformation process and how to deal with the complex issues brought about by digitalisation. Through such research, we hope to provide theoretical support and practical suggestions for realising sustainable and inclusive growth in the manufacturing sector, help China's manufacturing sector stay ahead of global competition, and contribute to the transformation, upgrading and prosperity of China's economy.

## **2. The Impact of the Digital Economy on China's Manufacturing Industry**

### **2.1. Application of Digital Technology in Manufacturing**

With the rapid development of information technology, the application of digital technologies in the manufacturing industry has become increasingly widespread and has become an important engine for driving high-quality development. These technologies have not only changed the mode of production in the manufacturing industry, but also reshaped corporate strategies, production dynamics, and the value creation process.

The application of Artificial Intelligence (AI) in the manufacturing industry is at the heart of digital technology. AI brings intelligent production decision-making to the manufacturing industry. Through machine learning and deep learning algorithms, companies are able to analyse huge amounts of production data in real time, predict market trends, optimise production schedules, and even make adaptive adjustments during the production process, which significantly improves production efficiency. In addition, the application of AI in robotics, such as collaborative robots (Cobots), is replacing some of the repetitive labour and improving production accuracy, while working in tandem with human workers to improve overall production efficiency.

Big data, on the other hand, is the key to achieving precision manufacturing. By collecting and analysing huge amounts of data from the production process, enterprises can gain a deeper understanding of product performance, user needs and market trends, and then carry out personalised design and customised production. Big data also helps enterprises optimise supply chain management and predict demand fluctuations, thus reducing inventory costs and improving response speed. The application of data mining and analysis technology enables enterprises to discover patterns in a large amount of historical data, predict future trends, and provide strong support for decision-making.

Cloud computing technology, on the other hand, provides elastic and scalable computing resources for the manufacturing industry, lowering the threshold of enterprise informatisation and enabling small businesses to enjoy the dividends of digitisation. Cloud computing supports remote collaboration, enabling design, production, service and other aspects of the design can cross the geographical limitations and improve the efficiency of collaboration. At the same time, resource pooling in the cloud also enables enterprises to quickly adjust computing resources according to business needs, reducing IT costs and improving agility.

Internet of Things (IoT) technology builds smart factory environments by realising real-time interactions between equipment and equipment and equipment and people through sensors and network connections. IoT technology not only

enhances the self-monitoring and self-repairing capabilities of equipment, but also supports data exchange between devices and promotes the intelligence and automation of production processes, thereby improving productivity and quality.

Driven by these digital technologies, the manufacturing industry is gradually transforming into a platform economy. By building digital platforms, enterprises are able to integrate internal and external resources and achieve service-oriented and networked operations. For example, by building an open innovation platform, enterprises can cooperate with suppliers, customers, research institutions and other parties to share knowledge and accelerate product innovation. The platform economy model has also given rise to new business models such as shared manufacturing and crowdsourcing design, further expanding the profitability of the manufacturing industry.

However, the use of digital technologies is not without challenges. Data security and privacy protection are growing concerns, and organisations need to find a balance between data use and protection. The skills gap is also a major obstacle. As technology iterates, companies need to continuously train their employees and improve their digital literacy to adapt to new work demands. Therefore, policy guidance and investment in education are crucial to ensure the smooth adoption of digital technologies in the manufacturing sector.

The application of digital technologies in the manufacturing sector has opened up new paths to high-quality development, reshaping the manufacturing value chain through technological, model and organisational innovations. However, it is also crucial to address related challenges, including improving regulations to safeguard data security, enhancing education to close the skills gap, and optimising policies to promote a healthy digital environment. Only then will China's manufacturing sector be able to take full advantage of the digital economy and achieve sustainable, inclusive and high-quality development.

### **2.2. Impact of Digital Transformation on Industrial Structure**

The in-depth development of the digital economy not only promotes the change of production mode within the manufacturing industry, but also has a far-reaching impact on the entire industrial structure. This impact is mainly reflected in the optimisation and upgrading of industrial structure, the rise of new industries and the digital transformation of traditional industries.

The digital economy has promoted the optimisation and upgrading of the industrial structure of the manufacturing industry through technological innovation and model innovation. The labour-intensive and resource-consuming characteristics of the traditional manufacturing industry are gradually being replaced by new technology-intensive and knowledge-intensive industries. The application of digital technologies, such as intelligent manufacturing and industrial Internet, has enabled the manufacturing industry to extend to the higher end of the value chain and increase the added value of products. At the same time, with the trend towards personalisation and customisation of products and services, the market demand for high-value-added and high-technology products has increased, prompting the development of the industrial structure in the direction of high technology and high value-addedness.

The digital economy has given rise to a large number of

emerging industries, such as cloud computing, big data and artificial intelligence, which have not only become the new driving force for economic growth, but also provided technical support and market space for the transformation and upgrading of the manufacturing industry. For example, the rise of the platform economy, such as e-commerce platforms, sharing economy platforms, etc., not only changed the way of commodity trading, but also promoted the manufacturing industry from a product provider to a service provider, expanding the profitability of the manufacturing industry. The development of the industrial Internet links various links such as production, service and consumption, forming a brand-new industrial ecology and providing a broad stage for innovation and value-added in the manufacturing industry.

Furthermore, digital transformation has transformed traditional industries and revitalised them. The traditional manufacturing industry has improved its production efficiency and product quality through the application of digital technologies to achieve lean production and intelligent management. For example, through the introduction of IoT technology, remote monitoring and maintenance of equipment has been realised, reducing production costs and improving the service life of equipment. The application of digital technologies in supply chain management, such as predictive analytics and smart logistics, has made the supply chain more agile and efficient and reduced operational risks.

However, changes in industrial structure have also brought new challenges. On the one hand, the development of the digital economy has exacerbated inter-industry differentiation, and the widespread application of digital technologies has led to the rapid growth of some industries, while it may also lead to the squeezing of some industries with outdated technologies and difficulties in transformation. On the other hand, the rapid iteration of emerging technologies requires enterprises to constantly update their technologies in order to maintain competitiveness, which to some extent increases the pressure on enterprises to innovate.

Therefore, in promoting industrial restructuring, the Government should strike a balance between equity and efficiency, and through policy guidance and support, help traditional industries to transform smoothly and prevent structural imbalances in the social economy. At the same time, it should encourage and support the development of new industries, especially those in the field of cutting-edge technologies that can drive the overall upgrading of the manufacturing industry. Through education and training, the digital skills of the labour force should be upgraded to ensure that they are able to adapt to new job requirements in the process of digital transformation.

The impact of digital economy on industrial structure is multi-dimensional, which brings about the optimisation and upgrading of industrial structure and the rise of new industries, as well as poses the challenge of industrial restructuring. Manufacturing enterprises, the government and all sectors of society need to work together to grasp the opportunities of the digital economy and deal with the complex issues brought about by industrial restructuring, in order to achieve structural optimisation and sustainable development of the manufacturing industry, and to inject new vitality into the transformation and upgrading of China's economy.

### **3. Transformation and Upgrading of the Manufacturing Industry Driven by the Digital Economy**

#### **3.1. Development Trend of Smart Manufacturing**

Intelligent manufacturing, as a prominent symbol of the transformation and upgrading of the manufacturing industry driven by the digital economy, is leading a profound industrial revolution. It deeply integrates information technology, advanced manufacturing technology and artificial intelligence, aiming to build an efficient, flexible and green intelligent production system to achieve personalised, customised and networked production and further enhance the core competitiveness of the manufacturing industry.

Intelligent manufacturing will deeply explore the value of data and promote intelligent production decision-making. With the support of big data and cloud computing, enterprises can collect, analyse and apply production data in real time to achieve intelligent decision-making throughout the life cycle from design, manufacturing to service. Through predictive analyses, enterprises can accurately forecast market demand, dynamically adjust production plans, reduce inventory costs, and improve response speed. At the same time, data-driven fault prediction and health management can ensure the efficient and stable operation of production lines, reduce downtime and improve equipment utilisation.

Smart manufacturing will drive automation and adaptive production processes. The combination of robotics, machine vision and artificial intelligence algorithms enables smart manufacturing to achieve refined and precise production operations and improve product quality. Through autonomous learning and optimisation, the production system is able to adjust process parameters according to real-time production conditions and achieve adaptive production, thus better meeting the demand for personalised customisation. In addition, the intelligent logistics and warehousing system realises intelligent scheduling and precise distribution of materials through IoT technology, improving logistics efficiency.

Furthermore, smart manufacturing will promote product and service innovation. Driven by the platform economy, enterprises are able to integrate internal and external resources through an open innovation platform, collaborate with users, suppliers, research institutions and so on to co-design and develop products, and achieve service-oriented and networked operations. For example, through the co-creation mechanism involving users, enterprises are able to respond quickly to market changes, provide personalised products and services, enhance user experience and improve brand value.

However, the development of smart manufacturing also faces a series of challenges. With rapid technology iteration, enterprises need to continuously update their equipment and systems, which may bring greater investment pressure in the short term. At the same time, the demand for talent in smart manufacturing is also rising, and enterprises need to have composite talents who understand both manufacturing and information technology, which requires reforms in the education and training system. Data security and privacy protection have become a non-negligible issue in smart manufacturing, and enterprises need to establish a sound data protection mechanism to ensure the safety of data in the

process of use.

In this process of change, the Government plays an important role. It encourages enterprises to invest in smart manufacturing by providing policy support, such as financial subsidies and tax incentives, and at the same time, it strengthens the construction of digital infrastructure and promotes the spread of information networks. The government should also formulate sound data security regulations to protect the data rights and interests of enterprises and individuals, and maintain the justice and fairness of the digital environment. In addition, the Government should promote vocational education and continuing education to cultivate a high-quality workforce adapted to smart manufacturing and provide talent security for the intelligent transformation of the manufacturing industry.

Intelligent manufacturing is one of the key paths for the digital economy to promote the high-quality development of the manufacturing industry, and it will profoundly affect the production methods, product forms and business models of the manufacturing industry. Through the intelligent application of digital technology, manufacturing enterprises can improve production efficiency, enhance innovation capability, and achieve the transformation from large-scale manufacturing to customised and intelligent production. And the joint efforts of the government and all sectors of society will ensure the smooth progress of this transformation process, propelling China's manufacturing industry to maintain its leading position in global competition and contributing to the continued prosperity of the Chinese economy.

### **3.2. Impact of Digital Supply Chains on Manufacturing**

The digital supply chain is an important part of the transformation and upgrading of the manufacturing industry in the digital economy, which has reshaped the operation mode of the traditional supply chain through the integration of information technology, the Internet and big data analytics, improving the agility, transparency and efficiency of the manufacturing industry. The evolution of digital supply chain not only affects the logistics and information flow within the enterprise, but also extends to suppliers, partners and customers, forming a highly collaborative network.

The digital supply chain has significantly improved information sharing and collaboration. With the help of cloud computing and IoT technologies, enterprises are able to monitor all aspects of the supply chain in real time, from the procurement of raw materials to production, warehousing, logistics and sales, with a qualitative leap in the speed and precision of information flow. This transparency enables enterprises to respond quickly to market changes and make accurate decisions, while reducing inventory and transport costs. With an integrated supply chain management system, the collaboration between enterprises and suppliers becomes closer, allowing for predictive procurement and dynamic inventory management, reducing the risk of overstocking and inventory backlog.

The application of big data analytics in the digital supply chain helps enterprises to deeply explore the value of data. By analysing data such as historical orders, market trends and supplier performance, enterprises can forecast demand, optimise production schedules and even achieve personalised configurations in the supply chain. In addition, big data helps identify potential supply chain risks, such as supplier delays

and logistics disruptions, so that measures can be taken in advance to ensure the stable operation of the supply chain.

Further, digital supply chains drive innovation in service-based and networked business models. By building digital platforms, enterprises are able to provide supply chain management services, such as collaborative planning, forecasting and replenishment (CPFR), and supply chain financial services, such as supply chain financing. These services enhance the market competitiveness of enterprises and promote the diversification of the supply chain ecosystem. At the same time, the rise of the platform economy has enabled enterprises to connect with more partners to form cross-enterprise supply chain networks and achieve optimal resource allocation.

However, the implementation of a digital supply chain is not without challenges. Data security and privacy protection are primary considerations, and enterprises must ensure that data transmitted and stored in the supply chain network are properly protected against data leakage and misuse. In addition, as supply chain networks expand, organisations need to establish more sophisticated risk management systems to address potential risks such as supply chain disruption and fraud. At the same time, for the rapid iteration of technology, enterprises need to continue to invest and train to ensure that their employees have the skills to deal with complex supply chain systems.

Policy support and standard-setting are equally critical to the healthy development of digitised supply chains. The Government should promote the development of standards and specifications for supply chain data to enhance data interoperability and security. At the same time, the government should encourage enterprises to adopt advanced supply chain management technologies and provide corresponding financial support and incentives to promote the popularity of supply chain digitisation. The education and training system also needs to be reformed in order to cultivate advanced talents with digital supply chain management capabilities.

The digital supply chain, driven by the digital economy, is profoundly changing the way of supply chain management in the manufacturing industry, promoting the improvement of production efficiency and the innovation of business models. However, while enjoying the convenience of digitisation, enterprises also need to face the challenges of data security, risk management and technology update. Through policy guidance, technological innovation and talent cultivation, China's manufacturing industry is expected to make full use of the advantages of the digital supply chain to achieve efficient supply chain operations and provide strong support for high-quality development.

## **4. Conclusion**

In the article "A study on the digital economy driving the high-quality development of China's manufacturing industry", we delved into how the digital economy affects China's manufacturing industry through technological innovation, model innovation and organisational innovation, as well as the transformation and upgrading path of the manufacturing industry in this context. The study found that the digital economy has reshaped the value chain of the manufacturing industry, promoting the improvement of production efficiency and the optimisation of industrial structure. Enterprises have actively adopted digital technologies such as cloud computing, big data, and artificial intelligence to

personalise, service and network their products, and promote the transformation from traditional to smart manufacturing. At the same time, the development of the digital economy has given rise to new growth points such as the industrial Internet and the platform economy, stimulating the innovation vitality of the manufacturing industry.

Governments play an important role in this process, promoting the digitisation of the manufacturing sector through the construction of digital infrastructure, the opening up of data resources and the creation of an innovative environment. However, issues such as data security, privacy protection and skills gaps have come along with it, which need to be addressed through improved regulations, education and training. With the deepening development of the digital economy, new spaces for high-quality development of the manufacturing sector have been opened up, while new challenges have also been posed.

The conclusion states that the digital economy opens up a vast space for high-quality development of China's manufacturing sector, but also requires enterprises, governments and relevant stakeholders to work together to address complex issues and achieve sustainable and inclusive growth in the manufacturing sector. Manufacturing enterprises need to seize the opportunities of the digital economy, embrace new technologies and carry out internal reforms to adapt to the digital environment. Governments need to be forward-looking and flexible in their policymaking to support the transformation of the manufacturing sector while addressing the resulting socio-economic issues.

Under the impetus of the data economy, the improvement of the core competitiveness of the manufacturing industry and the upgrading of the industrial structure have become possible, which will not only help the manufacturing industry to maintain its leading position in the global competition, but also inject a strong impetus into the transformation, upgrading and sustained prosperity of China's economy. However, this is not an easy task, and each stage of change requires innovative thinking, deep integration of technology applications, and strong support from policy and education.

Therefore, the research in this paper not only provides a

theoretical basis and strategic guidance for manufacturing enterprises, but also policy recommendations for government decision-makers, aiming to promote China's manufacturing industry to achieve high-quality and sustainable development in the era of digital economy. Future research could further focus on practice cases in specific industries or regions, and how to face the challenges brought by the digital economy together through international co-operation to promote the common progress of the global manufacturing industry.

## Acknowledgments

This work is supported by Anhui University of Finance & Economics 2024 Undergraduate Research innovation fund project fund, Project number: XSKY24114.

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