

Research on the Strategy of Digital Transformation Driving Green Development of Manufacturing Industry under the Background of "Dual Carbon"

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Abstract: In the current context of "dual carbon", digital transformation has not only become a key means of transformation and upgrading in the manufacturing industry, but also an important strategy for promoting green development in the manufacturing industry. By introducing advanced technologies such as big data, cloud computing, and the Internet of Things, the manufacturing industry can achieve intelligent and refined production processes, effectively reducing energy consumption and pollutant emissions, and promoting the transformation of the manufacturing industry towards a green and low-carbon direction. This paper analyzes the internal mechanism of digital transformation driving the development of manufacturing industry based on the current situation of industry development, and then proposes feasible strategies for digital transformation driving green development of manufacturing industry. One is to build an intelligent cloud data sharing and digital energy management platform, increase policy support, and guide manufacturing enterprises to actively invest in digital transformation; The second is to build an ecosystem that deeply integrates digital technology and manufacturing, stimulating innovation potential in various industries; The third is to establish a big data analysis and decision-making system, fully leverage the role of big data, and enhance the core competitiveness of enterprises. Fourthly, stimulate the digital innovation vitality of the manufacturing industry; the fifth is to optimize talent introduction strategies and enterprise talent structure. The combination of multiple strategies effectively promotes the green development of the manufacturing industry.

Keywords: Digital Transformation, Green Development, Dual Carbon

1. Introduction

At present, currently, "carbon neutrality" has become an important measure for the global response to climate change. Many countries and regions have announced carbon neutrality goals, and businesses from various industries have also joined in carbon reduction actions [1]. However, the development of traditional manufacturing industry faces problems such as high consumption and emissions; therefore, promoting green development of manufacturing industry has also become an important strategy in China. Green development is a new development path that integrates economy, society, and ecology. Green and low-carbon transformation is also a comprehensive and systematic project [2]. Many scholars have put forward their own views on achieving green development in the manufacturing industry [3-4]. Some scholars believe that relying on institutions to achieve green and low-carbon transformation is the most important, while others believe that promoting the technological innovation and application of low-carbon technologies, establishing and improving the marketization of carbon markets, etc. can accelerate the green development of manufacturing [5-6]. Some scholars have also analyzed the promoting effect of digitalization on the green transformation and development of the real economy [7-14], and further analyzed how specific digital technologies can drive enterprises to gain huge competitive advantages [15]. Digital transformation is the core driving force of the digital economy. Through the deep integration of digital technology and the real economy, we continuously improve the digitalization and intelligence level of traditional industries, accelerate digital transformation, and reconstruct the economic development model. With the characteristics of green, efficient, and intelligent, it is an important engine driving the green development of the manufacturing industry.

2. The Inherent Mechanism of Digital Transformation in Manufacturing Industry Driving Green Development

2.1 The Significance of Digital Transformation in Manufacturing Industry

(1) Digital technology can significantly improve the resource utilization efficiency of the manufacturing industry. By introducing digital technology, manufacturing can achieve the refinement of production processes. The application of real-time monitoring equipment and data analysis tools enables enterprises to accurately grasp the resource consumption situation in the production process, thereby optimizing the production process, reducing energy consumption and resource consumption. This not only reduces waste and improves resource utilization efficiency, but also saves costs for enterprises and improves economic benefits.

(2) It can promote the transformation of manufacturing towards more environmentally friendly production methods. The application of digital technology can help enterprises improve production processes and product design, reduce waste rates, and reduce pollutant emissions. This not only reduces the negative impact on the environment, but also meets the current social requirements for environmental protection and sustainable development. The digital transformation has made the production methods of the manufacturing industry greener and environmentally friendly, laying the foundation for the sustainable development of enterprises.

(3) Can enhance the competitiveness of manufacturing enterprises. With the intensification of market competition, manufacturing enterprises need to continuously improve their efficiency and flexibility to cope with market changes. The application of digital technology can help enterprises achieve automation and intelligence in production, improve production efficiency and product quality. Meanwhile, digital technology can also help enterprises better understand customer needs and market changes, improve customer satisfaction, and thus enhance their competitiveness.

(4) This provides new opportunities for the innovative development of the manufacturing industry. Digital transformation enables enterprises to obtain market information and user feedback more quickly, thus enabling targeted product innovation and technological improvement. This can not only drive enterprises to continuously innovate and upgrade their products, but also achieve sustainable development and adapt to market changes and demands.

(5) It can promote the coordinated development of manufacturing and upstream and downstream industries. The application of digital technology can help enterprises optimize supply chain management, reduce costs, and improve the efficiency and competitiveness of the entire industry chain. Through collaborative development with upstream and downstream industries, manufacturing enterprises can better integrate resources, reduce costs, and improve efficiency, thereby achieving green and sustainable development.

2.2 Intrinsic Mechanism

Digital transformation is based on digital knowledge and information as key production factors, and technology embedding is the logical starting point of enterprise digital transformation. It embeds technologies such as the Internet of Things, cloud computing, big data, blockchain, and artificial intelligence into enterprise applications in a multi-dimensional way, providing core impetus for enterprise digital transformation. By utilizing the elements and characteristics of digital technology such as connectivity, integration, data, and platforms, we can meet the management needs of enterprises for information sharing, resource optimization and efficient production, intelligent production, and green innovation development. Through the transmission path of interconnection, integration and reconstruction, data-driven, and platform support, we can transplant from the outside of the enterprise to the inside of the system, generate a transmission effect, and then drive the green development of the manufacturing industry. The management transformation of embedding digital technology into the enterprise system has become a link between micro level technology application and macro level corporate governance innovation. Therefore, "technology application enterprise transformation green innovation" constitutes the internal mechanism of digital transformation in manufacturing driven by green development as shown in Figure 1.

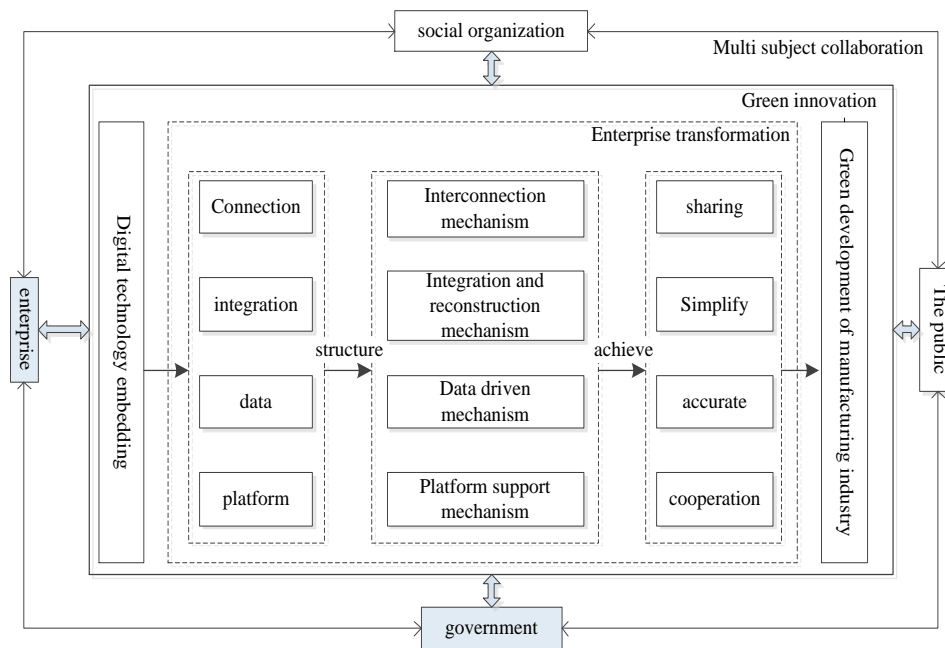


Figure 1: The intrinsic mechanism of digital transformation in manufacturing industry driving green development

3. Strategies for Driving Green and Low-Carbon Development of Manufacturing Industry through Digital Transformation

3.1 Building an Intelligent Cloud Data Sharing and Digital Energy Management Platform

On the one hand, the construction of a shared platform realizes the common sharing of big data, eliminates enterprise data silos, realizes the interconnection and sharing of data resources, and real-time monitoring and analysis of carbon emissions and other data, providing a basis for scientific decision-making and precise formulation of low-carbon development strategies for enterprises; On the other hand, efforts are being made to solve the problem of difficult and expensive financing for enterprises, support their transformation and development, and provide platform support for cooperation between banks, governments, enterprises, and businesses. Based on the collaborative and ecological construction of various levels of banking institutions, relevant government departments, and enterprises and institutions, an intelligent cloud data sharing platform architecture can achieve government bank collaboration, government enterprise marriage, and bank enterprise cooperation. Further assist the manufacturing industry in opening up financing channels, reducing financing costs, and promoting active development of enterprises.

3.2 Building an Ecosystem of Deep Integration between Digital Technology and Manufacturing Industry

The development of digital technology has posed challenges to various industries in terms of transformation and upgrading. Deep integration with the manufacturing industry can further stimulate innovation potential. The "One Circle, One Belt and Two Districts" also clearly pointed out that in the future, priority should be given to the layout of AI industry, the 5G industry and big data industry chain should be cultivated and developed, the industrial Internet development cooperation demonstration zone should be built, and the national new generation AI innovation and development pilot zone should be created. Therefore, we need to leverage policies and the trend of digital economy development to promote the integration of digital technology and manufacturing industry, promote its high-quality and green development, actively develop new forms of manufacturing industry, promote the intelligence and branding upgrading of advantageous industries, and rapidly develop leading industries; Encourage manufacturing enterprises to seize opportunities in digital construction and actively participate in the construction of new generation information infrastructure; Guide the manufacturing industry to accelerate the pace of industrial digitization, intelligence, and green transformation, and accelerate the iteration and upgrading of services and products.

3.3 Building a Big Data Analysis and Decision-Making System

Most manufacturing enterprises in our province do not yet have comprehensive data analysis tools, which have led to the underutilization of a large amount of information resources and the waste of data resources, which is not conducive to better leveraging the strategic role of data resources in the digital transformation process. The data-driven analysis and decision-making system is one of the necessary core competencies for every enterprise in the digital economy era, and is an important technical guarantee for the high-quality development and progress of enterprises. Therefore, building a comprehensive enterprise big data analysis and decision-making system can drive the high-quality development of manufacturing enterprises.

3.4 Stimulating the Digital Innovation Vitality of Manufacturing Industry

Digital technology is the driving force of innovation, empowering the manufacturing industry through platform construction, digital technology services, and other means, improving the supply and service capabilities of industrial digitization, and stimulating the digital vitality and innovation of the manufacturing industry. The growth of enterprises has driven innovation in digital technology, forming positive feedback and internalization. We can start from the following aspects: introduction of digital talents and education and training; Increase investment in digital research and development; Accelerate the transformation and application of technological achievements; Enterprise innovation and internal drive promote each other.

3.5 Optimizing Talent Introduction Policies and Enterprise Talent Structure

Optimizing talent introduction policies can ensure that manufacturing enterprises have sufficient human resources in digital transformation, improve their human capital level, and promote green technology innovation. Policy makers should formulate more scientific, reasonable, and flexible policies based on market demand and talent characteristics, in order to attract more innovative and practical talents to come to enterprises, providing strong talent support for green transformation and sustainable development. For example, by adjusting various incentive and subsidy policies reasonably, more talents can be attracted to the enterprise, stimulating their innovative vitality, and improving the human resource level of the enterprise; By establishing a talent evaluation system and conducting comprehensive, objective, and scientific evaluations of talents from multiple perspectives, we can select talents who truly possess innovative abilities and practical experience; By establishing diversified incentive mechanisms, including salary and benefits, career development, honor rewards, etc., to stimulate the enthusiasm and creativity of talents.

4. Summary

In the context of "dual carbon", digital transformation driving the green development of manufacturing industry needs to start from multiple aspects, and requires the joint efforts of the government, enterprises, and society to form a joint force in order to achieve sustainable development of the manufacturing industry. The implementation of strategies such as building an intelligent cloud data sharing platform for enterprise digital energy management, building an ecosystem that deeply integrates digital technology with manufacturing, and establishing a big data analysis and decision-making system can effectively promote the green development of manufacturing.

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