

The Impact of Digital Transformation on Low-Carbon Economy under the "Dual Carbon" Strategy

--Based on the Perspective of Energy Conservation and Emission Reduction of Chinese Enterprises

Wei qi Zhang^{1,*}, Wan cheng Jiang², Deyu Li¹

¹School of Economics, Anhui University of Finance and Economics, Bengbu, Anhui, 233030, China;

²School of International Economics and Trade, Anhui University of Finance and Economics, Bengbu, Anhui, 233030, China.

*Corresponding Author: 2578087831@qq.com

Abstract

With the increasing severity of global climate change, the "dual carbon" strategy has become a common goal for all countries. As one of the world's largest carbon emitting countries, China's enterprise energy conservation and emission reduction are of great significance for achieving the "dual carbon" goal. This article analyzes the current development status of Chinese enterprises from the perspective of energy conservation and emission reduction, and further explores the impact of digital transformation on the development of low-carbon economy and specific countermeasures.

Keywords

Digital transformation; Low carbon economy; Energy conservation and emission reduction; Dual carbon strategy.

1. Introduction

With the increasingly serious global climate change problem, countries have proposed energy-saving and emission reduction goals to develop low-carbon economies. As one of the world's largest carbon emitting countries, China's enterprise energy conservation and emission reduction are of great significance for achieving the "dual carbon" goals and strategies. The dual carbon strategy is a strategy proposed by the Chinese government to address climate change, which means that by 2030, China's carbon dioxide emissions will reach their peak; By 2060, China will achieve carbon neutrality. The implementation of this strategy requires the joint efforts of the government, enterprises, and the public.

Green waters and green mountains are golden mountains and silver mountains. In his recent article "Several Major Issues in Current Economic Work", Xi Jinping pointed out that we need to promote the green transformation of economic and social development, coordinate the promotion of carbon reduction, pollution reduction, green expansion, and growth, create conditions to accelerate the shift from "dual control" of energy consumption to "dual control" of carbon emissions, and continue to deepen the battle to protect the blue sky, clear water, and clean land, in order to build a beautiful China. There is no substitute for the ecological environment, which is difficult to survive without realizing it. China is still a developing country with a daunting task of achieving carbon peak and carbon neutrality, and the construction of ecological civilization is in a critical period of pressure and burden. Among them, whether digital transformation can play a major role in promoting further energy conservation and

emission reduction for Chinese enterprises, and whether it can play a major role in the comprehensive development of low-carbon economy, is a question that we should focus on.

Under the current trend of globalization, the digital economy is constantly developing rapidly with the integration and penetration of technology and various industries in various countries, gradually becoming a powerful driving force for economic growth. In the face of more turbulent and uncertain complex forms of the world economy, the digital transformation of "Internet plus" and other forms has demonstrated tenacity and patience.

In terms of its academic significance, the digital economy, as a new type of service industry at present, has endowed unlimited potential for the transformation and upgrading of national low-carbon economy, and has gradually become an important topic in the academic community of various countries. Scholars have conducted extensive research on the regional digital economy and the digital economy related to industrial enterprises. Therefore, in order to explore the impact of digital transformation on the development of low-carbon economy, it is crucial to study the digital economy and improve the corresponding system. In practical terms, this article provides an in-depth summary of the current situation and challenges of energy conservation and emission reduction in Chinese enterprises, explores the driving effect of the digital economy on the low-carbon economy from the perspective of the dual carbon strategy, and reveals countermeasures and suggestions for digital transformation on energy conservation and emission reduction. Based on the professional knowledge learned, propose relevant suggestions to better leverage the positive impact of the digital economy on economic growth, drive economic recovery after the epidemic, and improve the efficiency of China's economic operation.

Digital transformation can provide enterprises with more efficient and environmentally friendly production methods, which has a positive effect on promoting the development of low-carbon economy. In the context of the new generation of technological revolution, as a new driving force for enterprise technological innovation and structural reform, whether digital transformation can assist Chinese enterprises in energy conservation, emission reduction, and low-carbon economic development is a key issue that connects the "dual carbon" strategy at the macro level and relates to the realization of enterprise transformation and upgrading at the micro level. It urgently requires us to conduct in-depth research.

2. Current Situation and Challenges of Energy Conservation and Emission Reduction in Chinese Enterprises

With the increasing severity of global climate change and environmental pollution, energy conservation and emission reduction by Chinese enterprises have become a hot topic of concern at home and abroad. In the past few decades, China's economy has achieved remarkable achievements, but at the same time, it is also facing severe challenges of energy consumption and environmental pollution. In order to achieve sustainable development, the Chinese government and enterprises have taken measures to increase energy conservation and emission reduction efforts.

2.1. Current Situation of Energy Conservation and Emission Reduction in Chinese Enterprises

(1) Optimization of energy structure. In recent years, China has achieved positive results in adjusting its energy structure. Carbon free technologies, such as renewable energy technologies such as nuclear energy, solar energy, wind energy, and biomass energy, have developed rapidly. China accounts for nearly half of the global production of solar cells. The installed capacity of wind power is also increasing year by year, becoming the world's largest wind power market.

(2) Promotion of energy-saving technologies. In the past 10 years, China has promoted a large number of energy-saving technologies, covering multiple fields such as industry, construction, and transportation. Enterprises have reduced energy consumption and carbon emissions through technological innovation, management optimization, and other means. According to statistics, the energy consumption per unit of GDP in China has decreased by nearly 40% in the past 10 years.

(3) The carbon emission trading market is gradually established. In order to promote enterprises to reduce carbon emissions, the Chinese government actively constructs a carbon emission trading market. In 2011, China began conducting pilot projects for carbon emission trading in cities such as Shenzhen and Shanghai. In 2017, the national carbon emissions trading market was officially launched, providing enterprises with a trading platform for carbon emissions.

2.2. Challenges faced by Chinese enterprises in energy conservation and emission reduction

(1) The total energy consumption is relatively high. Although China has achieved significant results in energy conservation and emission reduction, the total energy consumption is still relatively high. In 2019, China's total energy consumption reached 4.86 billion tons of standard coal, ranking first in the world. The huge energy consumption base makes the task of energy conservation and emission reduction still challenging.

(2) Pressure on industrial structure adjustment. For a long time, China's economic development has relied on a high energy consumption and high emission industrial structure. In the process of transformation and upgrading, how to resolve excess capacity and promote industrial structure adjustment has become an important challenge for enterprises to save energy and reduce emissions.

(3) Insufficient technological innovation. Although China has made certain achievements in renewable energy and other fields, there is still a gap between its core technology and the international advanced level. Increasing technological innovation and breaking through key technological bottlenecks is the key to energy conservation and emission reduction for enterprises.

(4) Insufficient policy implementation efforts. In some regions and industries, the implementation of energy-saving and emission reduction policies is insufficient, resulting in some enterprises' energy consumption and emissions not decreasing but increasing. Improving policy implementation and increasing punishment for illegal enterprises are important means to promote energy conservation and emission reduction in enterprises. Chinese enterprises have developed rapidly in the past few decades, becoming one of the world's largest sources of carbon emissions.

3. The Impact of Digital Transformation on Low-Carbon Economy and Enterprise Energy Conservation and Emission Reduction

3.1. Optimize production processes and improve resource utilization efficiency

The digital transformation has brought a large amount of data and information, which enterprises can use to optimize production processes, improve resource utilization efficiency, and thereby reduce energy consumption and carbon emissions. For example, enterprises can achieve automation and intelligence in the production process by introducing intelligent production lines, automated equipment, and management systems, reducing manual intervention and energy waste. In addition, enterprises can also identify bottlenecks and problems in the production process through data analysis, and make targeted improvements to improve production efficiency.

In the process of digital transformation, enterprises can also adopt advanced energy management systems to monitor and analyze energy consumption in real-time, achieving refined energy management. By optimizing production processes and energy management, enterprises can effectively reduce energy consumption and carbon emissions per unit of product, and achieve low-carbon economic goals.

3.2. Promote green manufacturing and reduce production process pollution

Digital transformation helps enterprises achieve green manufacturing and reduce pollution emissions during production processes. Firstly, enterprises can use digital technology to monitor and treat pollutants such as wastewater and exhaust gas, ensuring that emissions meet standards. Secondly, enterprises can optimize production processes and raw material selection through data analysis to reduce the generation of pollutants. In addition, enterprises can also introduce environmental protection equipment, such as waste recovery systems and energy recovery systems, to achieve green production processes. Taking the electric vehicle industry as an example, digital transformation has brought about the greening of processes such as battery manufacturing and electric vehicle manufacturing. Enterprises have reduced energy consumption and pollution emissions in battery production by introducing intelligent production lines and optimizing production processes. At the same time, the popularization of electric vehicles also helps to reduce carbon emissions in the transportation sector and promote low-carbon economic development.

3.3. Innovate energy-saving and emission reduction technologies to promote low-carbon economic development

The digital transformation has driven innovation and research in energy-saving and emission reduction technologies among enterprises. Enterprises can continuously develop new energy-saving technologies, clean energy, etc. through digital technology to provide technical support for achieving carbon neutrality goals. For example, in the process of digital transformation, enterprises can increase their research and application of renewable energy technologies, such as solar energy, wind energy, biomass energy, etc. In addition, enterprises can also develop new energy-saving equipment and management systems, such as smart homes and smart buildings, to reduce energy consumption.

Taking China's electric vehicle industry as an example, enterprises have increased their research and development investment in electric vehicle charging facilities, battery technology, and other aspects during the digital transformation process, promoting the rapid development of the electric vehicle industry. The popularization of electric vehicles helps to reduce carbon emissions in the transportation sector and promote low-carbon economic development.

4. Countermeasures and Suggestions

4.1. Strengthen policy guidance and promote digital transformation of enterprises

The government should increase its support for digital transformation of enterprises at the policy level, in order to effectively guide enterprises to adopt low-carbon production methods for digital transformation and promote the development of low-carbon economy. At the same time, enterprises can also improve production efficiency and energy utilization efficiency through digital transformation, reduce costs and carbon emissions, and achieve sustainable development goals.

(1) Develop support policies for digital transformation, encourage enterprises to invest in digital technology and equipment, improve production efficiency, and reduce energy consumption. The government can provide financial subsidies and tax incentives to reduce the

cost of digital transformation for enterprises, establish specialized digital transformation service institutions, provide technical consulting, market analysis and other services to help enterprises better carry out digital transformation. For example, providing low-cost financing support for low-carbon enterprises to establish a green financial system and promote enterprise transformation and upgrading. In addition, the government can also strengthen the construction of digital infrastructure, improve network speed and quality, and provide better conditions for enterprise digital transformation.

(2) Promote digital application platforms, which can provide various digital tools and resources to help enterprises achieve digitalization in various aspects such as production, management, and marketing. In addition, the government can promote digital supply chain platforms to help enterprises achieve intelligent management and optimization of the supply chain, reducing resource waste and environmental pollution.

4.2. Optimize supply chain management and reduce industrial chain carbon emissions

Enterprises should start from the supply chain and optimize procurement, production, logistics and other links through digital transformation to reduce carbon emissions throughout the entire industrial chain.

(1) Realize transparency and visualization of the supply chain, helping enterprises to grasp various links and processes in the supply chain in real-time. Through digital platforms and IoT technology, enterprises can track the source and destination of goods, understand the production and inventory status of suppliers, and predict future market demand and supply situation. This can help enterprises make more informed decisions, optimize resource allocation in the supply chain, reduce inventory and transportation costs, and thus reduce carbon emissions in the industrial chain.

(2) Promote green supplier evaluation standards to help companies screen suppliers that meet environmental requirements. Digital platforms can provide data analysis functions to help enterprises understand the environmental performance and carbon emissions of suppliers, promote low-carbon transformation of upstream and downstream enterprises in the supply chain, and select more environmentally friendly suppliers for cooperation to jointly reduce carbon emissions. In addition, digital platforms can also provide intelligent contract functions, helping enterprises sign more green and sustainable contracts with suppliers, and promoting low-carbon development of the industrial chain.

(3) Assist enterprises in strengthening the monitoring and management of energy consumption and carbon emissions in the supply chain through digital technology. Through digital platforms, enterprises can conduct supply chain carbon accounting, monitor energy consumption and carbon emissions in real time, provide data support for emission reduction, and timely identify and solve high energy consumption and emissions issues. In addition, digital technology can also provide enterprises with energy management and carbon emission management tools, helping them develop more scientific and effective energy-saving and emission reduction measures.

4.3. Leveraging the advantages of digital technology and innovating low-carbon business models

Enterprises should fully utilize digital technology, innovate business models, and achieve low-carbon development.

(1) Combining big data and artificial intelligence technology, develop an intelligent energy management platform to further enable enterprises to achieve real-time monitoring, analysis, and optimization of energy. Utilize technologies such as big data and cloud computing to achieve intelligent monitoring and optimized scheduling of production processes, reducing

energy consumption. By using an intelligent energy management platform, enterprises can collect and analyze energy data, achieve real-time monitoring and intelligent control of energy, understand energy consumption and carbon emissions, predict future energy demand and supply, and reduce energy consumption and carbon emissions. At the same time, enterprises can use artificial intelligence technology to deeply mine and analyze energy data, propose more scientific and effective energy-saving and emission reduction plans, and innovate low-carbon business models.

(2) Utilize blockchain technology to establish a green supply chain financial service platform, providing enterprises with more convenient and reliable financial services. Through the green supply chain financial service platform, enterprises can achieve digital management of the supply chain, intelligent risk control, and innovation of green financial products. At the same time, the platform can also provide financial institutions with more comprehensive and accurate supply chain financial data support, helping them better evaluate the credit risk and investment value of enterprises. This can help enterprises reduce financing costs and risks, and promote the development of a low-carbon economy.

(3) Leveraging the advantages of IoT technology, building a comprehensive service system for smart homes and smart cities, and assisting enterprises in achieving intelligent home and city management. Through the comprehensive service system of smart home and smart city, enterprises can provide users with a more convenient, comfortable, and environmentally friendly living environment and services. For example, enterprises can provide users with smart home devices and services to achieve intelligent management and optimization of home energy; At the same time, it can also provide smart transportation, intelligent security and other services for cities, improving the efficiency and quality of urban management. This can help enterprises achieve sustainable development goals and promote the development of low-carbon economy.

4.4. Strengthen corporate social responsibility and build a low-carbon corporate culture

Enterprises should strengthen their awareness of social responsibility, establish low-carbon development goals, incorporate low-carbon development into their corporate strategies and cultural construction, build a digital low-carbon corporate culture, and further clarify the role and positioning of enterprises in the low-carbon economy. At the same time, this also helps to improve the brand image and market competitiveness of the enterprise, achieving a win-win situation of economic and social benefits.

(1) Develop corporate social responsibility reports and digital carbon emission disclosure systems to publicly disclose the responsibilities and achievements of enterprises in environmental protection, social welfare, and other aspects. By disclosing carbon emission data and implementing emission reduction measures, companies can increase transparency, accept social supervision, and encourage employees and stakeholders to participate in low-carbon actions together. In addition, enterprises can work with partners such as suppliers and customers to establish carbon emission standards and indicators, promoting low-carbon development of the entire supply chain.

(2) Create a digital low-carbon corporate culture atmosphere and increase employees' awareness and participation in low-carbon development. Firstly, enterprises can promote green office, energy conservation and emission reduction, popularize low-carbon knowledge and concepts, and make employees aware of the importance of low-carbon and sustainable development through internal publicity, training, and educational activities. Secondly, enterprises can establish a low-carbon reward mechanism to encourage employees to actively participate in low-carbon actions and innovation, and to commend and motivate outstanding employees. In addition, enterprises can promote the joint participation of employees and

communities in low-carbon practices by organizing low-carbon volunteer services, public welfare activities, etc., and further create a good low-carbon corporate culture atmosphere.

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