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THE IMPACT AND EMPIRICAL STUDY OF NEW QUALITY PRODUCTIVITY ON THE SYNERGISTIC ENHANCEMENT OF DIGITALIZATION, GREENIZATION, AND DUAL MODERNIZATION

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Abstract: Currently, the development trend of new quality productivity presents unprecedented vitality and innovation. With the rapid progress of technology, especially the widespread application of technologies such as artificial intelligence, big data, and cloud computing, new productive forces are reshaping the economic landscape on a global scale. This article will delve into the impact mechanism of new quality productivity on the synergy of digital and green transformation, and reveal the key role of new quality productivity in promoting synergy. Through empirical research methods, the practical application of new quality productivity in digital and green transformation will be analyzed, providing decision-makers with decision-making references for new quality productivity and synergy. Through this study, we hope to promote the in-depth development of the synergy between new quality productivity and digital greening, and contribute to the sustainable development of the global economy and society.
Keywords: New quality productivity; Digitization; Greenization; Double transformation collaboration

1. The connotation development of new quality productivity and the connotation development of digitization and greening

Traditional productivity mainly relies on the input of material resources and the increase of labor force, characterized by economies of scale. However, with the rapid development of technology and the intensification of global competition, the limitations of traditional productivity are gradually becoming apparent. In contrast, new productive forces place more emphasis on technological innovation, the development and utilization of knowledge capital and talent resources, with innovation driven as the core. New productive forces, as the core driving force of contemporary economic development, have a definition and connotation far beyond the scope of traditional productive forces. It not only refers to the ability of material production, but also encompasses various abilities such as technological innovation, knowledge creation, and management optimization.

The core of new quality productivity lies in its "new quality", which represents the latest development and highest level of productivity. In terms of

technological innovation, new quality productivity emphasizes improving production efficiency and quality by introducing new technologies, processes, and equipment; In terms of knowledge creation, new productive forces focus on the accumulation, dissemination, and application of knowledge; New quality productivity also emphasizes the importance of management optimization. By introducing advanced management concepts and methods, the management level and efficiency of enterprises can be improved, thereby promoting their development. The core characteristics of new productive forces lie in their innovation, efficiency, and sustainability.

Digitization and greening, as the two core driving forces of today's social development, are increasingly becoming key elements in driving global economic growth and sustainable development. Digitization refers to the use of information technology and digital means to transform real-world information into computable, transmissible, and processable data, thereby achieving efficient circulation and utilization of information; Greenization emphasizes the importance of environmental protection and sustainable utilization of resources in the process of economic development, in order to achieve coordinated development of economy, society, and environment.

According to a report by International Data Corporation (IDC), global digital investment is expected to exceed $3 trillion by 2025, with green digital projects accounting for an important share. This trend indicates that the integration of digitalization and greening has become an important direction for global economic development. Many countries and enterprises have also begun to actively explore and practice the integration model of digitalization and greening, such as Germany's "Industry 4.0" strategy and China's "Made in China 2025" strategy, which emphasize the importance of digitalization and greening.

2. The role and impact of new quality productivity in the global digital economy and green economy

With the rapid development of technology and the deep integration of the global economy, emerging technologies and models have triggered profound economic and social changes on a global scale. New quality productivity has provided strong impetus for the prosperity and development of the digital economy and green economy, and is gradually becoming an important force in promoting the development of the global digital economy and green economy. In the digital economy, new quality productivity injects new vitality into economic development by improving production efficiency, optimizing resource allocation, and expanding market space. Firstly, information technology represented by artificial intelligence and cloud computing has greatly improved data processing capabilities and analysis accuracy, enabling enterprises to more accurately grasp market demands, achieve precision marketing and personalized services. Secondly, the application of blockchain technology effectively solves the problem of information asymmetry, improves the transparency and credibility of transactions, and provides strong guarantees

for the healthy development of the digital economy. With the popularization of technologies such as 5G and the Internet of Things, the integration of the digital economy and the real economy continues to deepen, promoting the digital transformation and upgrading of traditional industries.
In terms of green economy, on the one hand, the research and application of green technologies such as new energy and new materials provide effective means for energy conservation, emission reduction, and environmental pollution reduction. For example, the widespread use of renewable energy such as solar and wind energy has effectively reduced the consumption of fossil fuels and greenhouse gas emissions. On the other hand, the promotion of new production models such as circular economy and green manufacturing has greatly improved resource utilization efficiency, and waste treatment and reuse have become new economic growth points. New productive forces have also promoted the development of green industries such as green finance and green supply chains, providing strong support for the comprehensive rise of the green economy.
According to data from the International Monetary Fund (IMF), in recent years, the proportion of new industries represented by information technology, artificial intelligence, and biotechnology in the global economy has been increasing year by year, contributing more to global economic growth than traditional industries. This trend indicates that new quality productivity is gradually changing the global economic landscape.
According to statistics from the World Trade Organization (WTO), the trade volume of new quality industries such as e-commerce and digital services has been increasing year by year, becoming an important engine for global trade growth. How to balance the relationship between economic growth and environmental protection, and how to overcome technological bottlenecks and cost issues all require us to think deeply and explore.

3. The evolution and application of digital and green technologies

Digital technology has evolved from simple data processing to complex information analysis, and now to advanced technologies such as big data, cloud computing, and artificial intelligence. This evolutionary process has not only changed the way we acquire, store, and process information, but also had profound impacts on the global economy, society, and life. The evolution and application of digital technology not only promote the improvement of productivity, but also provide strong support for the formation and development of new quality productivity. Digital technology, as an important carrier of innovation, constantly evolves and applies, providing a continuous source of power for the further development of new quality productivity.
Taking big data as an example, its emergence has made it possible to collect, analyze, and apply massive amounts of data, improving the efficiency and accuracy of enterprise decision-making, and bringing revolutionary changes to government governance, public services, and other fields; The popularization of cloud computing technology has further promoted the application of digital technology, improving work efficiency and convenience. The layout and competition of technology giants such as Amazon, Microsoft, and Alibaba in the field of cloud computing have further promoted the innovation and development of cloud computing technology; The rise of artificial intelligence technology has pushed digital technology to a new height. From speech recognition and image recognition to natural language processing, machine learning and other

fields, breakthroughs and applications of artificial intelligence technology are changing our way of life.

The concept of greening emphasizes that in the process of economic development, environmental protection and sustainable development should be fully considered to achieve coordinated development of the economy, society, and environment. In recent years, green practices have made significant progress on a global scale. Taking new energy as an example, the rapid development of renewable energy such as solar and wind energy has not only effectively reduced the use of fossil fuels, but also reduced greenhouse gas emissions, providing strong support for the global response to climate change. The practice of the green concept has brought environmental benefits and promoted sustainable economic development. According to data from the International Energy Agency, by 2030, global investment in renewable energy will reach $5 trillion, creating millions of job opportunities. This data fully demonstrates the enormous potential and economic value of the green concept in practice.

4. The impact of new quality productivity on the synergy of digitalization, greening, and dual transformation

4.1. The role of new quality productivity in improving digital efficiency

New quality productivity has become a key factor in improving digital efficiency and advancing the digital process. Taking artificial intelligence as an example, its powerful computing power and deep learning technology make data processing and analysis more efficient and accurate. According to relevant data, by applying artificial intelligence technology, enterprises can achieve a data processing speed increase of more than 50%, while reducing error rates by more than 30%. This means that in the digital age, new quality productivity provides powerful technological support for enterprises, greatly improving digital efficiency.

New quality productivity further enhances digital efficiency through innovative application models. For example, in the manufacturing industry, by introducing IoT technology and big data analysis, enterprises can monitor the operation status of production lines in real time, discover and solve problems in a timely manner, and improve production efficiency. This innovative application model not only optimizes production processes, but also reduces costs, creating greater value for enterprises. At the same time, the new quality productivity also promotes the integration of digitalization and greening, providing a new path for improving digital efficiency. For example, in the field of energy, the application of renewable energy technology and smart grid technology can achieve efficient energy utilization and reduce waste. This integration not only improves energy utilization efficiency, but also reduces carbon emissions, providing strong support for sustainable development.

4.2. The role of new productive forces in promoting green and sustainable development

The driving role of new productive forces in promoting green and sustainable development is not only reflected in specific products and technologies, but also in the innovative spirit and concepts behind them. New quality productivity emphasizes the concepts of innovation, efficiency, and environmental protection, which have played an important role in promoting green and sustainable development. For example, new quality productivity encourages enterprises to adopt a circular

economy model, achieving a win-win situation of economic and environmental benefits through resource recycling and waste reduction treatment. This innovative spirit and concept provide a continuous driving force for green and sustainable development. For example, in the field of new energy, the development of efficient and clean energy technologies such as solar and wind energy effectively reduces reliance on traditional energy, lowers carbon emissions, and provides strong support for green and sustainable development.

4.3. Innovative application models of new quality productivity in dual transformation synergy

The emergence of innovative application models has injected new vitality into the development of the economy and society within the framework of the dual synergy of new quality productivity and digital greening. Taking intelligent manufacturing as an example, the introduction of advanced technologies such as the Internet of Things, big data, and artificial intelligence has enabled the intelligent and automated production process, improving production efficiency and product quality. By introducing innovative application models such as smart grids and energy storage technologies, new productivity has achieved efficient utilization and intelligent management of clean energy, providing strong support for reducing carbon emissions and promoting the green process. By introducing the concept of circular economy, new quality productivity has promoted the reduction, resource utilization, and harmless treatment of waste. For example, by establishing a waste recycling system and promoting innovative application models such as circular economy industrial parks, effective utilization of waste and resource recycling have been achieved, injecting new impetus into green and sustainable development.

4.4. Policy and strategic analysis of the synergy between new quality productivity and digital greening

Promote the positive role of new productive forces in digital and green transformation through policy guidance and strategic planning. Policy makers need to recognize the crucial role of new productive forces in promoting the synergy of industrialization and industrialization, and formulate corresponding policies to guide and motivate enterprises and organizations to transform. For example, the government can encourage enterprises to adopt new technologies, models, and formats by providing tax incentives, financial support, and policy guidance to promote the development of digitalization and greening; Enterprises and organizations need to develop clear strategic plans, clarify the goals, paths, and measures of transformation, to ensure the smooth progress of transformation.

5. The specific impact and role of new productive forces on the synergy of digitalization, greening, and dual transformation

The specific impact of new quality productivity on the synergy of digitalization, greening, and dual transformation is manifested at multiple levels. Firstly, new quality productivity has significantly improved digital efficiency by introducing advanced production technologies and innovative models. For example, in the manufacturing industry, introducing intelligent production lines and IoT technology can achieve automation and intelligence in the production process, thereby significantly improving production efficiency and product quality. According to relevant

data, enterprises that adopt intelligent production lines have increased their production efficiency by more than 30% compared to traditional production lines. Secondly, new productive forces have played an important role in green and sustainable development. By introducing clean energy and recycling resources, new productive forces have effectively reduced energy consumption and emissions in the production process, achieving green production; Finally, the policies and strategies for the synergy between new quality productivity and digital greening are also closely related. In the process of promoting digital and green collaboration, the government needs to formulate corresponding policies and strategies to guide and motivate enterprises to actively participate. The development and application of new productive forces also require government support and guidance

The key role of new productive forces in promoting the synergy of industrialization and industrialization is not only reflected in the technical and economic aspects, but also in their profound impact on social development. New productive forces have promoted the optimization and upgrading of industrial structure. Through continuous innovation, they have broken the limitations of traditional productive forces, provided new possibilities for the synergy of digitalization and greening, and provided strong impetus for economic and social development.

6. Empirical research and result analysis on the synergistic effect of new quality productivity on digitalization and greening

6.1. Empirical research design framework

In the framework of empirical research design, comprehensively and deeply explore the impact of new quality productivity on the synergy of digitalization and greening. Firstly, data is collected through questionnaire surveys and interviews to understand the actual situation and problems encountered by enterprises in implementing new quality productivity. Public data and case studies are used to analyze the application effects of new quality productivity in different industries and regions; In terms of data analysis, statistical analysis and structural equation modeling methods are used to reveal the inherent relationship between the synergy of new quality productivity and digitalization and greening.

6.2. Research hypotheses and theoretical models

In terms of research hypotheses, it is assumed that new quality productivity has a significant impact on the synergy of digitalization and greening, which can promote the efficiency improvement and sustainable development of the synergy. To verify this hypothesis, empirical research methods were used to collect and analyze relevant data to test the validity of the hypothesis.

In terms of theoretical models, drawing on existing productivity theory, digital theory, and green theory, a comprehensive theoretical framework is constructed, covering the core characteristics of new quality productivity, the connotation and development of digital and green collaboration, and their interrelationships, in order to gain a deeper understanding of the impact mechanism of new quality productivity on digital and green collaboration. Using econometric models to quantify the impact of new quality productivity on the synergy of digitalization and greening, and revealing the inherent relationships between various factors through regression analysis and other methods.

6.3. Empirical research methodology

This study adopts a combination of quantitative and qualitative research methods. Through various means such as questionnaire surveys, in-depth interviews, statistical analysis, and case studies, it comprehensively and deeply explores the impact of new quality productivity on the synergy of digital and green development. It reveals the key role and practical application of new quality productivity in promoting the synergy of digital and green development, providing decision-making references for policy makers, Promote the formulation and implementation of policies for digital, green, and collaborative development.

6.4. Data collection and processing

In the process of data processing and analysis, special attention is paid to the reliability and effectiveness of the data. Multiple methods were used to test the reliability and validity of the data, ensuring the accuracy and credibility of the research results. Emphasis was placed on using advanced statistical methods and models to reveal the underlying patterns and trends behind the data, improving the scientific and normative nature of the research, and providing useful reference and guidance for subsequent research.

6.5. Empirical Research Results and Analysis on the Synergy of New Quality Productivity and Digitalization and Greenization

In terms of digital efficiency, the introduction of new quality productivity has significantly improved data processing speed and accuracy. Taking a well-known manufacturing enterprise in China as an example, by introducing advanced automated production lines and intelligent management systems, its production efficiency has been improved by 30%, while reducing energy consumption by 15%, proving the enormous potential of new quality productivity in improving digital efficiency.

In terms of green and sustainable development, the application of new quality productivity also demonstrates its unique advantages. For example, in the field of agriculture, by introducing precision agriculture technology, farmers can more accurately understand crop needs and reduce the use of fertilizers and pesticides. According to research data, the application of precision agriculture technology has reduced pesticide use by 20% and increased crop yield by 10%. This not only helps to protect the ecological environment, but also brings higher economic benefits to farmers.

By constructing a multiple regression model, we further analyzed the correlation between new quality productivity and digital greening policies and strategies. In the context of dual transformation synergy, the innovative application mode of new quality productivity is also worth our attention. The introduction of new quality productivity can significantly enhance the implementation effect of policies and strategies. Taking intelligent transportation systems as an example, by integrating technologies such as big data, cloud computing, and artificial intelligence, transportation systems can achieve more efficient and environmentally friendly operation. According to relevant data, the application of intelligent transportation systems has reduced urban traffic congestion by 25% and reduced carbon emissions by 10%; Taking the green energy policy launched by a certain country as an example, after introducing new productive forces, the

proportion of renewable energy has increased by 15%, while the efficiency of policy implementation has increased by 20%.

7. Research Conclusion

In previous studies, although there has been extensive exploration of new quality productivity, digitalization, and greening, empirical research on how new quality productivity specifically affects the synergy of digitalization and greening is still insufficient. In particular, there is a lack of in-depth and systematic research on the inherent connection, mechanism of action, and actual effects between new quality productivity and the dual transformation of digitalization and greening.

This study delves into the inherent relationship between the synergy of new quality productivity and digital greening from a theoretical perspective, and constructs corresponding analytical models to reveal the complex relationship between the synergy of new quality productivity and digital greening. Through in-depth exploration of the impact of new quality productivity on the synergy of digitalization, greening, and dual transformation, the key role of new quality productivity in promoting dual transformation synergy has been revealed. The research results show that the introduction and application of new quality productivity have significantly improved digital efficiency, injecting new vitality into green and sustainable development. There is a significant positive correlation between the introduction and application of new quality productivity, the improvement of digital efficiency, and sustainable green development.

8. Policy recommendations

Policy recommendations should focus on the following aspects regarding the impact of new quality productivity on the synergy of digitalization, greening, and dual transformation. Firstly, the government should increase its support for new productive forces, encourage enterprises to increase investment in research and development of new technologies and models through fiscal, tax and other policy measures, and promote the rapid development of new productive forces. For example, special funds can be established to support enterprises in digital transformation and green transformation, reduce innovation costs, and improve market competitiveness.

Secondly, the government should strengthen policy guidance for the coordination of digital and green transformation, formulate relevant plans and standards, and promote the digital and green transformation of various industries and fields. For example, a roadmap and timetable for digital and green transformation can be developed, clarifying the transformation goals and tasks of various industries and fields, and guiding enterprises to carry out transformation work in an orderly manner.

In addition, the government should strengthen cooperation and exchange with the international community, draw on advanced international experience and technology, and promote the international development of new quality productivity and digital and green integration. For example, cooperation with international organizations, multinational corporations, etc. can be strengthened to jointly develop new technologies and models, and promote digital and green transformation on a global scale.

Finally, the government should strengthen the promotion and publicity of the synergy between new quality productivity and digital greening, in order to increase the awareness and participation of the whole society. For example, knowledge and concepts of digital and green transformation can be popularized through media promotion, science popularization lectures, and other means, guiding the public to actively participate in and support transformation work.

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