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Review

# Digital green innovation economy for Industry 5.0

**Xiaolu Lv[1], Yiran Wang[1], Lirui Liu[1], Shi Yin[1,2,*]**

[1] College of Economics and Management, Hebei Agricultural University, Baoding 071001, China
[2] School of Economics and Management, Harbin Engineering University, Harbin 150000, China
*** Corresponding author:** Shi Yin, shyshi0314@163.com

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**Abstract:** In the context of current global economic development, Industry 5.0 and the digital green innovation economy have become hot research topics, and they are related to each other, providing new opportunities for sustainable development. Using the literature research method and a comprehensive analysis of relevant literature, this paper discusses the internal mechanism and realization path of Industry 5.0, enabling a green innovation economy, and concludes that the implementation of Industry 5.0 and the digital green innovation economy is of great significance in terms of resource efficiency, waste reduction, and carbon emission reduction. However, there are also challenges, such as technical barriers, regulatory issues, and funding needs. To achieve the Sustainable Development Goals, the government, enterprises, and society need to work together to formulate appropriate policies and strategies to promote the integration of Industry 5.0 and the digital green innovation economy. This paper aims to emphasize the importance of a digital green innovation economy oriented to Industry 5.0, provide new impetus for future economic growth, reduce environmental pollution, promote sustainable social development, and lay a foundation for subsequent research.

**Keywords:** Industry 5.0; digital green innovation; sustainable development; innovative economy

## 1. Introduction

With the development of The Times, industrialization has experienced a great revolution, from the initial industrial revolution to Industry 4.0. Today, a new era of Industry 5.0 is rising, bringing new opportunities and challenges to the global economy. Different from the previous industrial era, Industry 5.0 focuses on the deep integration of people and technology, representing the digital, intelligent, and sustainable production mode, while emphasizing environmental friendliness. In this context, the digital green innovation economy has become a key driver of Industry 5.0. In the future, to solve the contradiction between the global environment and socio-economic development, digital, green, and innovation will become the key words for sustainable economic development [1]. By integrating emerging technologies, renewable energy, and green manufacturing methods, it provides more development opportunities for enterprises and helps them thrive in the digital age. In this paper, the literature conducts comprehensive and in-depth research on Industry 5.0 from the aspects of research subject, research perspective, and research method, which provides a valuable reference for the digital green innovation economy.

Industry 5.0 faces the following practical problems: Industry 5.0 requires more advanced technology and automation systems, including the Internet of Things, artificial intelligence, big data, and so on. The implementation and application of

these technologies will require substantial investment and technical support. At the same time, many technical problems need to be solved. In Industry 5.0, the acquisition, transmission, storage, and processing of large amounts of data all need to be protected to ensure data security and privacy. Industry 5.0 requires a large number of high-quality talents, including technology research and development, manufacturing, marketing, and other talents, but there is a relative shortage of such talents in the market. It has brought some challenges to enterprise recruitment and talent training. The so-called green economy is a new economic form developed with market orientation, traditional industrial economy as the foundation, and harmony between economy and environment as the goal. It is a development state that the industrial economy has emerged and demonstrated the ability to adapt to human environmental protection and health needs, which is conducive to driving the development of environmental protection and related industries and cultivating new economic growth points [2].

Although the current research has discussed the relationship between Industry 5.0 and the digital green innovation economy to a certain extent, there are still some research gaps. In terms of research subjects and perspectives, there is less research on Industry 5.0, and even less research on Industry 5.0 from the background and perspective of digital transformation. There is no further discussion on how Industry 5.0 can promote digital green innovation in practical applications or the specific challenges and solutions it may face in this process. This paper studies the internal mechanism of Industry 5.0 enabling a digital green innovation economy, which is of great significance to the sustainable development of the global economy and the guidance of global industrial competition, and lays a foundation for subsequent research. In addition, existing research has not conducted a comprehensive and in-depth analysis of the actual effects and potential impact of digital green innovation in Industry 5.0.

In view of the above problems, this paper aims to fill this research gap, deeply analyze the interactive mechanism between Industry 5.0 and the digital green innovation economy, and explore its actual impact on the sustainable development of enterprises. Through a comprehensive review of the relevant literature, we aim to provide a strong foundation for future research and provide clearer guidance for innovation and sustainable development in the industrial field. The research framework of this paper can be shown in **Figure 1**.

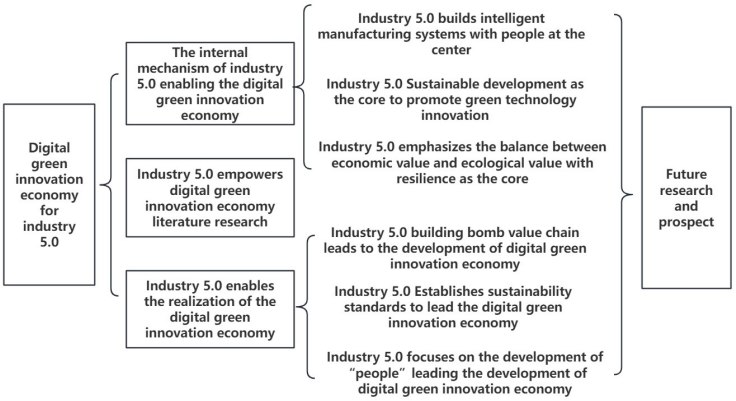


**Figure 1.** Article frame diagram.

# 2. Literature

## 2.1. Industry 5.0

Times keep improving, and Industry 5.0 is on the map. It represents a brand new industrial model, fundamentally different from previous industrial revolutions, incorporating artificial intelligence, big data, the Internet of Things, and advanced automation technologies to create a more intelligent and highly adaptive production system.

Research on the development status of Industry 5.0: Industry 5.0 is regarded as the next industrial evolution. Its objective is to leverage the creativity of human experts in collaboration with efficient, intelligent, and accurate machines in order to obtain resource-efficient and user-preferred manufacturing solutions compared to Industry 4.0 [3]. Luke pointed out that although Industry 4.0 has successfully integrated advanced technologies to improve efficiency, we have begun to realize that we have missed the opportunity to change the world and turned to Industry 5.0 as the next great industrial revolution [4]. The development of Industry 5.0 will create a new manufacturing site, and the relationship between man and machine will evolve into a new stage of "integration". Currently, human-oriented, human-centered, man-machine-integrated manufacturing is emerging [5]. Huang points out that Industry 5.0 recognizes the power of industry, makes production respect the boundaries of the earth at the center of the production process, achieves social goals beyond employment and growth, and becomes a resilient provider of prosperity. Human-centered, sustainable development, and resilience are the cores of the three industries 5.0 [6].

For industrial 5.0 challenges, Liu and King emphasize at the environmental level that industrial 5.0 emphasizes sustainability, requires enterprises to respect the natural ecology, reduce energy consumption, and reduce carbon emissions that damage the environment. They attach great importance to the efficiency of resource utilization and the development of a circular economy, although industrial 5.0 prospects come with some challenges, including technology integration, data privacy, human resources training, and other issues. These challenges need to be adequately addressed to achieve the target of Industry 5.0 [7]. Chen pointed out that the digital transformation has brought great pressure to enterprises. From Industry 4.0 to Industry 5.0, this transformation has brought about an unprecedented demand for faster, better, and smarter production systems [8].

Based on the above literature research, the research direction of Industry 5.0 is limited to research on the status quo of Industry 5.0 without in-depth research. This paper combines Industry 5.0 with the green innovation economy to study its development.

## 2.2. Digital green innovation economy

The theory of the green innovation economy has attracted the attention of the academic circle both at home and abroad and has made many achievements in its theoretical research. In his book The Blue Book of Green Economy, Pearce puts forward that the essence of green economy is the economic theory of sustainable

development with coordinated economic development and ecology as the core, and the economic development mode is characterized by reasonable protection of resources and energy and is beneficial to human health. Ecological economists Hermangolis and Paul Hawkins, whose works on sustainable development and the green economy have laid the foundation for the development of a green innovation economy [9], Green economy development strategies and the transition from conventional economic development models to green economies have become necessary due to the negative impact of conventional economic development models on the local and global environment. In addition, some international organizations, such as the United Nations Environment Programme, have also played a key role in promoting a green innovation economy [10]. Hou pointed out in the article that at the Fifth Plenary Session of the 18th CPC Central Committee, Comrade Xi Jinping put forward the "five development concepts" of innovation, coordination, green, openness, and sharing. On this basis, the academic circle has put forward the "green innovation economic theory", combining green, innovation, and economic development, with innovation as the core driver, to form a set of economic development theory systems more conducive to sustainable development. The digital green innovation economy will combine green and innovation to develop the economy [11]. Based on the intermediary perspective of green technology innovation capacity and energy consumption structure, using panel data from 30 provinces from 2021–2023, the results show that the internal mechanism of the digital economy driving the green development of China's sports goods manufacturing industry mainly includes three dimensions: allocation of production factors, innovation and optimization of industrial structure, and development of digital governance [12]. Hu and Yang, based on the panel data of 254 cities in China from 2011 to 2021, empirically explore the relationship between the digital economy and green economic development, and the intermediary effect model is used to identify the action mechanism of green technology innovation. The research found that the digital economy has become an important force to promote green economic development [13].

To sum up, digital green economy development is in line with the concept of development. Scholars for the development of digital green economy development focus on how it can promote the development and utilization of clean energy, promote green consumption, and change the change the way of life. For its in-depth research and combined with industrial 5.0 theoretical research, which is relatively few, this paper makes up for the defects of industrial 5.0 combined with digital green innovation economy.

## 2.3. Industry 5.0 and the green innovation economy

Industry 5.0 and the green innovation economy represent the future direction of industrial and economic development. Industry 5.0 aims to improve the efficiency of resource utilization, reduce waste, and reduce environmental impact, which is in line with the core goal of the green innovation economy. Digital technology supports green innovation, and Industry 5.0 relies on advanced digital technologies, such as the Internet of Things, big data analytics, and artificial intelligence. These

technologies can be used to monitor and optimize energy use, production processes, and supply chains to achieve more environmentally friendly production methods. This literature examines in depth the paradigm shift of Industry 5.0 to manufacturing, with a particular focus on its role in promoting a green innovation economy. Through in-depth analysis of actual cases, it reveals the positive impact of Industry 5.0 on improving resource efficiency and reducing carbon emissions [14]. These are the core principles of the green and innovation economies. In terms of economic growth, competitiveness, policy support, and new business opportunities, Industry 5.0 and the green innovation economy support each other to jointly promote technological innovation, sustainable development, and economic growth. This synergy will create more opportunities for future industrial and economic development, but it also poses a series of new challenges. This literature uses a case study of the impact of Industry 5.0 on sustainable development, with special attention to its effect on promoting green innovation. Through practical cases, we demonstrate how Industry 5.0 promotes the adoption of green technology and realizes sustainable production [15]. It is particularly important to study the integration of digital technology into green innovation and production processes to improve the performance of digital green innovation and the competitiveness of enterprises [16]. Liu and Zhao found that the development of the digital economy has reduced industrial comprehensive energy consumption and coal consumption and improved the efficiency of energy and resource utilization [17].

To sum up, for industrial 5.0 combined with green digital economy research, which mainly focuses on digital transformation and green manufacturing correlation research, intelligent manufacturing technology, how to help the greening of industrial production, etc., this paper, on the basis of the existing industrial 5.0, can assign the inner mechanisms of green innovation economy and development.

## 3. The internal mechanism of Industry 5.0 enabling the digital green innovation economy

### 3.1. Industry 5.0 builds intelligent manufacturing systems with people at the center

The Industry 5.0 human-centered intelligent manufacturing system highly integrates the production process with artificial intelligence technology, promoting a higher level of production efficiency and quality. As a human-centered manufacturing paradigm, promoting sustainable manufacturing emphasizes the role of Industry 5.0 in the digital green innovation economy, with special attention to human-machine collaboration, resource optimization, and the reduction of environmental impact [18]. In the digital green innovation economy, this system enables intelligent resource management and optimization and reduces energy and resource waste through real-time monitoring and feedback. At the same time, the use of AI to predict and adjust production processes can help cope with resource shortages and environmental risks in advance.

### 3.2. Industry 5.0 promotes green technology innovation with sustainable development at its core

One of the core concepts of Industry 5.0 is sustainable development. Digital green innovation management activities are the core of low-carbon intelligent development of prefabricated construction enterprises for sustainable urban development [19]. To deeply study the role of Industry 5.0 in sustainable development, especially in its contribution to promoting green technology innovation. Through case study and theoretical analysis, it shows how Industry 5.0 leads the development of the digital green innovation economy [20]. The measurement system of digital green innovation in the manufacturing industry was constructed according to the PSR framework. This study not only proposes an evaluation index system of the digital green innovation level but also puts forward policy guidance and practical guidance of digital technology to accelerate the green and intelligent manufacturing industry [21]. Under the current' double carbon' policy, the building materials manufacturing industry has seriously restricted the improvement of social and environmental benefits. Digital green innovation in photovoltaic building materials enterprises plays a crucial role in solving the problems of high-quality environmental and economic development [22]. This means that the production system should not only meet the needs of economic growth but also provide sustainable development while respecting the environment and society. In the digital green innovation economy, Industry 5.0 encourages enterprises and technology developers to adopt green technologies and innovation to reduce carbon emissions, reduce pollution, and improve resource efficiency. This sustainable, development-oriented innovation helps to achieve the green economy goal. In the context of carbon peak and carbon neutrality, digital green innovation development is becoming more and more important for enterprises. In order to effectively improve green competitiveness and increase profits, photovoltaic building materials enterprises must choose digital green innovation projects for investment [23].

### 3.3. Industry 5.0 emphasizes the balance between economic value and ecological value with resilience as the core

Discuss resilience manufacturing in the Industry 5.0 era, emphasizing the importance of system resilience in response to external shocks [24]. Special attention is paid to how Industry 5.0 balances economic and ecological values and improves the ability of enterprises to adapt to environmental changes. At present, manufacturing enterprises should not only continue to implement Industry 4.0 and carry out JIT lean management but also forward-lookingly practice the idea of Industry 5.0 and take into account the JIC model to cope with the impact of uncertain factors [25]. In the digital green innovation economy, this resilience involves not only economic aspects but also ecological aspects. How to integrate Industry 5.0 principles to achieve sustainable and intelligent manufacturing [26]. Its system resilience allows companies to respond more to environmental changes, such as climate change and resource shortages. This resilience emphasizes the balance of

economic and ecological values, and achieves the goal of a green innovation economy through more intelligent and sustainable manufacturing.

## 4. Industry 5.0 enabling digital green innovation economy research

With the rapid development of digital technology and the increasing importance of environmental sustainability, the integration of Industry 5.0 and the digital green innovation economy has become a hot topic of research and practice. This paper will analyze how Industry 5.0 enables the digital green innovation economy by combining the empirical research of Industry 5.0 and evaluating its potential impact and development trend. Industry 5.0 is an extension of Industry 4.0, emphasizing the high degree of integration and collaboration between humans and machines. The digital green innovation economy focuses on the application of digital technology to environmental protection and sustainable development. Some studies point out that Industry 5.0 technologies such as the Internet of Things, big data analysis, and intelligent manufacturing have been applied in the fields of environmental protection and resource management. For example, the energy monitoring and optimization in smart city projects use sensors and big data to achieve more efficient energy use. Some scholars use fixed effect models, intermediary effect models, and threshold models to promote industrial green transformation [27]. In this study, firstly, a hierarchical regression method and a structural equation model are used to empirically study the static mechanism of DGI among enterprises in the IBSC. The results of the study are as follows: The digital integration degree and green knowledge synergy ability of the IBSC are conducive to improvements in digital green innovation performance among the enterprises involved in this chain. The degree of digital integration in this chain is the dominant factor affecting the performance of digital green innovation among these enterprises [28]. This integration helps to reduce energy waste, reduce carbon emissions, and promote the development of digital green innovation. In the application of digital technology in environmental protection, empirical research shows that the application of digital technology in the field of environmental protection has a positive impact on resource management and environmental monitoring. For example, big data analysis and smart sensors can help agriculture achieve fine management and reduce the waste of fertilizer and water resources. At the same time, the application of digital technology in the field of clean energy has also made significant progress, such as solar energy and wind energy monitoring and optimization. Research has also emphasized the impact of green innovation and the digital economy, the internal mechanism of industrial low carbon transformation, and the mechanism and effect of the digital economy enabling industrial low carbon transformation, concluding that the digital economy can enable industrial low carbon transformation by promoting green technology innovation [29]. Some studies focus on the role of industrial 5.0 technology in creating jobs, improving the quality of life, and promoting sustainable development. Digital green innovation is the core factor that affects the digitalization and decarbonization strategy of agricultural high-end equipment manufacturing systems [30]. For example, digital agricultural projects have created agricultural science and technology jobs in rural areas and increased farmers' income levels. At

the same time, smart city projects have improved the quality of life of urban residents, such as reducing traffic congestion and intelligent garbage sorting.

To sum up, the integration of Industry 5.0 and the digital green innovation economy can bring significant opportunities for environmental protection and sustainable development. However, research also points to challenges such as privacy and data security issues, as well as an imbalance in technology adoption. Future research needs to explore these issues in more depth to better understand the mechanisms and effects of Industry 5.0 enabling a digital green innovation economy.

## 5. Industry 5.0 empowering the green innovative economy: Implementation pathways

### 5.1. Industry 5.0 building an elastic value chain to lead green innovation economic development

Build a flexible value chain to lead the development of a green and innovative economy. This includes the establishment of a digital and intelligent supply chain system, realizing the real-time matching of supply and demand through big data and the Internet of Things technology, reducing resource waste, and improving the efficiency of resource utilization. The Xu and Wang Commission announced Industry 5.0. Industry 4.0 is considered to be technology-driven, whereas Industry 5.0 is value-driven [31]. Industry 5.0: Considering the circular economy, a key factor is data sharing, sharing data in all fields, improving the transparency of the supply chain, maximizing the use of resources, and reducing waste. Lexible value chains also need to support sustainable production and eco-friendly manufacturing processes, ensuring reduced environmental burden during the life cycle of products. This path will contribute to the development of a green innovation economy and make production more environmentally friendly and sustainable.

### 5.2. Industry 5.0 establishing sustainable standards to lead green innovation economic development

To establish sustainable standards to lead the development of a green and innovative economy. This includes promoting industries to develop and adhere to stricter environmental and sustainable standards and promoting the development and application of green technologies. Through digital monitoring and intelligent control, Industry 5.0 can ensure that enterprises follow these standards and reduce environmental risks. In addition, this path also encourages enterprises to adopt ecological design and green production methods to fundamentally reduce resource consumption. Through the establishment of sustainable standards, Industry 5.0 will lead to the sustainable development of the green innovation economy.

### 5.3. Industry 5.0 focusing on “human” development to lead green innovation economic development

Focus on the development of “people” to lead the development of a green and innovative economy. This includes developing workers with digital technology and environmental awareness and supporting research and education for green

innovation and sustainable development. Enterprises, universities, and scientific research institutions are conducive to the effective development of a cooperative digital green innovation process [32]. In the construction of the new relationship between man-machine integration, it is pointed out that the United States, Japan, China, and Europe have fierce competition around the research and development of man-machine integration manufacturing-related technology and application scenario system development and lead the technical route, technical standard, and business model [33]. Man-machine integration manufacturing under the framework of Industry 5.0. Through digital and intelligent technology, people should be in the core position of the new Industry 5.0 manufacturing site. Machines should cooperate with the habits and rhythms of people so that they can better participate in environmental decision-making and promote the development of a green innovation economy. This path will make the power of "people" an important leading factor in the development of a green and innovative economy.

## 6. Future research and prospects

Through the research of Industry 5.0 and the digital green innovation economy, combined with the existing literature, it is concluded that there are still many problems in the current development of Industry 5.0. The Industry 5.0 enabling green innovation economy can achieve a more efficient, sustainable, environmentally friendly, and circular economic growth model and promote the prosperity of mankind and the earth.

### 6.1. Fundamental theoretical issues

In the field of Industry 5.0 and the digital green innovation economy, there are some basic theoretical issues that still need further research and discussion. First of all, we can study the basic principles and framework of industrial 5.0. This paper is the third part of the three internal mechanisms of industrial 5.0, which are, respectively, human-centered building intelligent manufacturing systems, sustainable development as the core to promote green technology innovation, and toughness as the core emphasizes economic value and ecological value balance, in order to better understand its connotation and operation mechanism. In addition, the theoretical basis of the green innovation economy is also worth exploring, including theoretical issues on how to strike a balance between economic growth and sustainability.

### 6.2. Challenges under Industrial 5.0

Through the analysis of empirical studies in the existing literature, Industry 5.0 brings great opportunities but is also accompanied by a series of challenges. Future research could focus on addressing these challenges, such as privacy and data security issues during the digital transition, the challenges of technology integration and standardization, and an in-depth study of the impact of Industry 5.0 on employment and society. These issues will help guide policy and practice to make the development of Industry 5.0 more sustainable and healthy.

### 6.3. Industrial 5.0 and the digital green innovative economy in the context of China

In the context of China, a global manufacturing power, research on Industry 5.0 and the digital green innovation economy is of special importance. Future research can focus on China's practice and experience in the field of "Industry 5.0" and explore China's policy support and leading areas in the digital green innovation economy. This will help strengthen China's influence in the global digital green innovation field and promote sustainable development and green transformation. Through the in-depth discussion of these future studies and prospects, we can better understand the relationship between Industry 5.0 and the digital green innovation economy, meet the relevant challenges, and promote the sustainable development and prosperity of the innovation economy. The development of this field will bring more opportunities and hope for future industrial and economic development.

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## References

1. Sjödin D, Parida V, Visnjic I. How Can Large Manufacturers Digitalize Their Business Models? A Framework for Orchestrating Industrial Ecosystems. California Management Review. 2021; 64(3): 49-77. doi: 10.1177/00081256211059140
2. Dincer I, Zamfirescu C. Potential options to greenize energy systems. Energy. 2012; 46(1): 5-15. doi: 10.1016/j.energy.2011.11.061
3. Maddikunta PKR, Pham QV, B P, et al. Industry 5.0: A survey on enabling technologies and potential applications. Journal of Industrial Information Integration. 2022; 26: 100257. doi: 10.1016/j.jii.2021.100257
4. Luke. Industry 5.0 and Circular Economy. World Electronic Components. 2023; 11: 9-11.
5. Deng Z. Realize Industry 5.0: the construction of a new relationship between man-machine fusion. Tsinghua Management Review. 2023; 108(Z1): 52-55.
6. Huang Y. Industry 5.0: High-quality development for the future. Tsinghua Management Review. 2023; 108(Z1): 60-66.
7. Liu J, Wang DL. Industry 5.0 for enterprise resilience construction from the pursuit of Just in Time to both Just in Case. Tsinghua Management Review. 2023; 110(4): 22-33.
8. Chen J. Intelligent Innovation Strategy in Industry 5.0: Achieving Performance Beyond World-Class. Tsinghua Management Review. 2022; 99(3): 6-17.
9. Pearce D. Blueprint for a Green Economy. London: Earthscan Publications Ltd; 1989.
10. Ali EB, Anufriev VP, Amfo B. Green economy implementation in Ghana as a road map for a sustainable development drive: A review. Scientific African. 2021; 12: e00756. doi: 10.1016/j.sciaf.2021.e00756
11. Hou X, Cai L. Evaluation Research of the Application of Green Innovative Economic Theory in Rural Revitalization Practice. Anhui Agricultural Science Bulletin. 2019; 25(12): 6-10.
12. Chen P, Fu KX, Yi XL, Fu ZH. The internal mechanism and influence effect of digital economy driving the green development of Chinese sports goods manufacturing industry. Journal of Wuhan Institute of Physical Education. 2023; 12: 51-60.

13. Hu HY, Yang LQ. Research on the effect and mechanism of the digital economy in enabling the green development of the economy. Regional Economic Review. 2023; 6: 84-93.
14. Wang C, Li Z. Digital Economy, Green Technology Innovation, and Carbon Welfare Performance. Enterprise Economy. 2023. doi: 10.3969/j.issn.1003-9229.2023.42.036
15. Li Z, Zhang Y, Zhao Z. Digital Economy and Industrial Green Transformation: Intermediary and Threshold Effects Based on Technological Innovation. Industrial Technology and Economy. 2023; 42(10): 3-16.
16. Yin S, Yu Y. An adoption-implementation framework of digital green knowledge to improve the performance of digital green innovation practices for industry 5.0. Journal of Cleaner Production. 2022; 363: 132608. doi: 10.1016/j.jclepro.2022.132608
17. Liu J, Zhao QY. Mechanism test of industrial green transformation and upgrading enabled by digital economy. Lanzhou Academic Journal. 2023; 10: 68-85.
18. Yang L. Digital Economy Empowerment and Industrial Low-Carbon Transformation: Internal Mechanisms and Empirical Evidence. Journal of Jilin University of Finance and Economics. 2023; 39(4): 28-36.
19. Yin S, Dong T, Li B, et al. Developing a Conceptual Partner Selection Framework: Digital Green Innovation Management of Prefabricated Construction Enterprises for Sustainable Urban Development. Buildings. 2022; 12(6): 721. doi: 10.3390/buildings12060721
20. Wang Z, Gao T, Wang R. Research on Digital Innovation Empowering Digital Economic Development: A Literature Review. Studies in Science Management. 2022; 40(5): 91-97.
21. Yin S, Yu Y. An adoption-implementation framework of digital green knowledge to improve the performance of digital green innovation practices for industry 5.0. Journal of Cleaner Production. 2022; 363: 132608. doi: 10.1016/j.jclepro.2022.132608
22. Hu C, Sun T, Yin S, et al. A systematic framework to improve the digital green innovation performance of photovoltaic materials for building energy system. Environmental Research Communications. 2023; 5(9): 095009. doi: 10.1088/2515-7620/acf550
23. Xu S, Gao K. Green finance and high-quality development of marine economy. Marine Economics and Management. 2022; 5(2): 213-227. doi: 10.1108/maem-01-2022-0001
24. Dong T, Yin S, Zhang N. New Energy-Driven Construction Industry: Digital Green Innovation Investment Project Selection of Photovoltaic Building Materials Enterprises Using an Integrated Fuzzy Decision Approach. Systems. 2022; 11(1): 11. doi: 10.3390/systems11010011
25. Liu J, Wang DL. Industry 5.0 for enterprise resilience construction from the pursuit of Just in Time to both Just in Case. Tsinghua Man-agement Review. 2023; 4: 22-33.
26. Li GY, Liu L. Industry 5.0: To become a more meaningful industrial system. Tsinghua Management Review. 2023; 108(Z1): 67-72.
27. Wang Y, Tong Y. Value innovation strategy for Industry 5.0. Tsinghua Management Review. 2023; 108(Z1): 73-81.
28. Dong T, Yin S, Zhang N. The Interaction Mechanism and Dynamic Evolution of Digital Green Innovation in the Integrated Green Building Supply Chain. Systems. 2023; 11(3): 122. doi: 10.3390/systems11030122
29. Li GY, Liu L. Industry 5.0: To become a more meaningful industrial system. Tsinghua Management Review. 2023; 108(Z1): 67-72.
30. Yin S, Wang Y, Xu J. Developing a Conceptual Partner Matching Framework for Digital Green Innovation of Agricultural High-End Equipment Manufacturing System Toward Agriculture 5.0: A Novel Niche Field Model Combined with Fuzzy VIKOR. Frontiers in Psychology. 2022; 13. doi: 10.3389/fpsyg.2022.924109
31. Xu X, Lu Y, Vogel-Heuser B, et al. Industry 4.0 and Industry 5.0—Inception, conception and perception. Journal of Manufacturing Systems. 2021; 61: 530-535. doi: 10.1016/j.jmsy.2021.10.006
32. Zhao Y, Zhang Y, Song Y, et al. Enhancing building energy efficiency: Formation of a cooperative digital green innovation atmosphere of photovoltaic building materials based on reciprocal incentives. AIMS Energy. 2023; 11(4): 694-722. doi: 10.3934/energy.2023035
33. Ma N, Yao X, Chen F, et al. Human-centric Smart Manufacturing for Industry 5.0. Journal of Mechanical Engineering. 2022; 58(18): 88. doi: 10.3901/jme.2022.18.088