

# INDUSTRIAL AND SUPPLY CHAIN COORDINATION AND SUSTAINABLE DEVELOPMENT IN WESTERN CHINA UNDER THE DIGITAL ECONOMY

LingYan Sun

*Silk Road Economic Belt Core Area Industrial High-quality Development Research Center, Business School, Xinjiang Normal University, Urumqi 830054, Xinjiang, China.*

*Corresponding Email: linda.lsunny@163.com*

**Abstract:** With the rapid development of the digital economy, big data, cloud computing, the Internet of Things and artificial intelligence have driven a new round of industrial transformation. In this process, data has gradually become the core driving factor, not only reconfiguring the collaborative mechanism between the industrial chain and the supply chain, but also promoting the sustainable development of the overall operation. This study, based on the background of the development of the digital economy, focuses on the western region of China and explores how regional industrial chains and supply chains can coordinate and interact to achieve sustainable economic development. Starting from the enabling mechanism of the digital economy, this article deeply analyzes the internal logic of the "dual-chain" synergy and its specific impact on regional sustainable development. This article expands the analytical framework of the collaboration between industrial chains and supply chains at the theoretical level and the mechanism of digital economy empowering the linkage and driving sustainable development of industrial chains and supply chains. Further, based on the current development status of industrial chains in the western region and the challenges and current situation faced by the development of the digital economy, corresponding suggestions are put forward. This research further enriches the relevant theories on digital economy and regional sustainable development, providing a reference basis for enhancing the economic and social development level of the western region with the aid of digital technology.

**Keywords:** Supply chain; Industrial chain; Sustainable development; Digital economy

## 1 INTRODUCTION

The rapid development of information technology has made the digital economy an important force driving economic growth. It has not only changed the structure of traditional industrial and supply chains but also reshaped their operational logic. Empowered by digital technology, supply chains have become more flexible and efficient, and the flow of information and resources between regions and industries has significantly accelerated. This transformation not only supports sustained economic growth but also makes development more resilient. The synergy between industrial and supply chains has led to improved production efficiency and optimized resource utilization, directly enhancing economic competitiveness. More importantly, it is becoming a crucial path for promoting sustainable development strategies, striving for the simultaneous growth of economic, social, and environmental benefits [1].

The western region, as the strategic depth and important barrier of China's economic development, is undergoing profound changes in the reshaping and upgrading of its supply chain and industrial chain, which are deeply integrated with sustainable development. This is a promising yet challenging situation. From the perspective of the supply chain, the western region of China is experiencing a profound role transformation. With the continuous construction of major infrastructure such as the land-sea new channel of the China-Singapore connectivity project and the China-Europe freight train, this region has transformed from a region with lower openness and relatively lagging economy to a core land-based channel connecting the "Belt and Road Initiative" and directly reaching Central Asia and Europe. This characteristic of its geographical location has driven its supply chain function to shift from passively accepting industrial transfer from the east to actively building a cross-regional connection network, becoming an important fortress to ensure the security of the national industrial chain and supply chain and the smooth circulation of the domestic and international dual circulations [2]. At the industrial chain level, the western region has not simply replicated the development model of the east, but has based itself on its own resource endowment and taken a distinctive and clustered path. Its development process focuses on building a characteristic modern industrial system with new energy and new materials as key elements, relying on abundant clean energy and strategic mineral resources. Therefore, the core thread that must be long-term supported in this transformation is sustainable development. The ecological status of the western region is important but fragile, which determines that it must explore a new development path of ecological protection and economic growth that are mutually supportive. Therefore, the key to the future development prospects of the western region lies in achieving high-quality growth with resource intensification, green and low-carbon development, and transforming ecological advantages into economic advantages, truly achieving harmony and win-win between humans and nature [3].

However, the industrial chain and supply chain in the western regions still face many challenges, including a relatively single industrial structure, insufficient completeness of the industrial chain, scattered resources with low utilization

efficiency, and low efficiency in resource allocation due to information asymmetry. These factors have constrained the innovation ability and market competitiveness of the economy in the western regions [3].

The rise of the digital economy has provided opportunities for the western regions to solve their own development problems. From the perspectives of industrial upgrading and sustainable development, the digital economy has brought opportunities for the development of the western regions. In terms of industrial upgrading, the integration of digital technology with traditional industries can enhance production efficiency and improve the resilience of the industrial chain. For example, manufacturing enterprises in the western region have adopted digital management systems, with data stored and shared through blockchain to ensure the authenticity and non-modifiability of the data, improving the authenticity of supply chain information transmission and alleviating the phenomenon of data silos, thereby achieving resource optimization allocation [2]. Moreover, through the integration of data from multiple parties on cloud computing platforms, enterprises can dynamically adjust production plans based on actual needs, avoiding overcapacity [4]. Secondly, manufacturing industries utilize digital twins and other digital supply chain constructions to achieve simulation and simulation of the entire supply chain from suppliers, factories, distributors, to customers. Through digital algorithms, they can achieve real-time insights into the status of the supply chain and risk prediction, thereby enhancing supply chain resilience [5]. In terms of innovation-driven development, the wide application of digital technologies such as big data, artificial intelligence, and cloud computing provides a broader space for the western regions to cultivate new economic growth points, serving as a continuous driving force for attracting innovative talents and capital inflows. In terms of green transformation, digital technologies can empower energy conservation and emission reduction, precisely control pollution emissions using environmental monitoring big data, and promote the transformation of industries towards greening and low-carbonization. In agricultural development, digital platforms can be used to understand the market gaps of specialty agricultural products and guide agricultural production towards higher value categories; at the industrial level, through industrial internet monitoring of data on energy and other resource extraction and processing, production processes can be optimized. This precise allocation enables the western regions to break away from the "extensive development" path, gradually building a more reasonable and competitive industrial structure, thereby alleviating development difficulties.

The core objective of this study focuses on the collaborative mechanism of the industrial chain and supply chain in the western region of China under the background of the digital economy. This paper specifically examines the linkage and upgrading of the industrial chain and supply chain in the western region of China, and explores how the development of the digital economy drives the linkage and upgrading of the industrial chain and supply chain to empower sustainable development. This article mainly focuses on how digital technology changes the existing form and operation mode of industrial chains and supply chains to promote sustainable development. On this basis, we also explore from three perspectives - regional economic development, ecological environment optimization, and social equity - what support digital technology and the linkage of industrial chains and supply chains can provide for sustainable development. In terms of theoretical value, this research can help us build an interdisciplinary analytical framework integrating economics, supply chain management, regional economics, and sustainable development, and also deepen our theoretical understanding of "industrial synergy" and "supply chain management". In the past, studies on supply chains mostly focused on how individual enterprises or a certain industrial chain could improve efficiency; this time, we adopt a "meso perspective", that is, focusing on the linkage of industrial chains and supply chains at the regional level, with a particular emphasis on the collaborative cooperation among different industries and industrial clusters, and then analyze how industrial chains and supply chains achieve deep integration under the assistance of the digital economy. In terms of practical application, the value of this research is also obvious: by detailing the specific paths through which the digital economy plays a role, it can provide references for governments at all levels and enterprises. For example, how to use digital technology to deal with risks in industrial chains and supply chains, and how to optimize the industrial layout within a region, these practical problems can all find directions here.

## 2 RELATED CONCEPTS AND MECHANISMS

### 2.1 Concept and Current Situation

Currently, the digital economy has become a crucial driving force for the transformation of the global economy, and has also attracted continuous attention from the academic community. In simple terms, the digital economy refers to a new economic model that relies on the application of digital technologies to promote economic restructuring and reconfigure traditional industrial chains. Some scholars [1] have proposed that the digital economy is a new economic form centered on digital knowledge and information technology, with modern information networks as its carrier, and driven by information technology for development. It mainly consists of two parts: digital industrialization and industrial digitalization. Among them, industrial digitalization focuses on using digital technologies to upgrade and transform traditional industries, which has profoundly changed the ways of production, transactions, and consumption in society. Regarding the characteristics of the digital economy and its enabling role, we have made a brief summary in Table 1.

**Table 1** Characteristics and Enabling Functions of the Digital Economy

Feature	Description
---------	-------------

Data as a key production factor	Data is the core resource of the digital economy
Digital infrastructure as the core cornerstone	Digital infrastructure supports all digital activities
Digital technology drives economic growth	Technologies such as IT, the Internet of Things, big data, and AI promote development
Widespread application of digital resources	Digital resources widely penetrate traditional industries
In-depth integration of digital industries and traditional industries	In-depth collaboration between old and new industrial chains
Significant improvement in economic operation efficiency	Efficiency improvement in the entire process of production, circulation, and services

The theory of sustainable development serves as the fundamental principle guiding the coordinated development of the economy and society. Its core lies in achieving a dynamic balance among economic development, environmental protection, and social equity. Guided by this goal, the synergy between the digital economy and the industrial chain and supply chain has jointly formed a new paradigm for promoting sustainable development. Among them, the digitalization of supply chains serves as a key driving force, effectively promoting the construction of green supply chains and providing specific paths and support for achieving sustainable development [6]. The enabling role of digitalization can be simply summarized as using digital technologies to conduct refined management and optimization of the entire process of products from raw materials, production, sales to recycling. This can significantly reduce resource waste and environmental pollution, and effectively promote the construction of "green supply chains". If focusing on regional sustainable development, the western regions have the characteristics of both abundant resources and fragile ecology. This "both rich and fragile" contradiction determines that the western regions cannot follow the earlier "high energy consumption, high pollution" extensive development path. The green sustainable development strategy and digital transformation are the inevitable choice for achieving sustainable development in the western regions.

However, in the western regions, the application and innovation of relevant theories have significant practical significance and special challenges. On one hand, although the digital economy infrastructure construction in the western regions started relatively late, it has grown rapidly in recent years, and digital technology has become a key driving force for the linkage of regional industrial and supply chains. On the other hand, the shortage of talents, unbalanced infrastructure construction, and complex and changeable market environment determine the differentiation of the digital economy empowerment mechanism. Therefore, how to analyze the current development status and core challenges of regional industrial and supply chains in a local context, systematically evaluate the regional sustainable development level, and scientifically grasp the empowerment mechanism and implementation path of digital economy for regional industrial transformation have become important topics for promoting high-quality regional economic development and building a modern economic system. In-depth research on this topic has key theoretical value and practical significance for enhancing industrial chain resilience, optimizing supply chain layout, achieving regional coordination and green low-carbon development. Table 2 compares the core elements of digital economy, industrial and supply chain linkage, and sustainable development.

**Table 2** Comparison of Core Elements of Digital Economy, Industrial Chain and Supply Chain Linkage, and Sustainable Development

Theoretical Element	Main Content
Digital Economy	By taking data as the key element, we can achieve the digitalization, networking and intelligence of economic activities.
Industrial Chain and Supply Chain Linkage	Cross-enterprise, cross-industry, and cross-regional collaborative integration and process optimization; upstream and downstream collaboration, information sharing, integration of logistics and

capital flow, and risk sharing.

Sustainable Development

Resource conservation, low-carbon emissions, ecological protection, social equity, inclusive growth.

## 2.2 THE DIGITAL ECONOMY EMPOWERS THE LINKAGE AND SUSTAINABLE DEVELOPMENT OF REGIONAL INDUSTRIAL AND SUPPLY CHAINS

The current term "digital economy" refers to a new economic form driven by digital technologies. Technologies such as big data, cloud computing, the Internet of Things, and 5G communication, which are commonly heard of, all fall within its scope - it has brought profound changes to the traditional economic model [7]. From a macro perspective, the digital economy has taken a path of development driven by innovation by integrating various technologies and reconfiguring information resources. This has been of great help in reshaping and optimizing the industrial chain and supply chain. Especially when the industrial chain and supply chain cooperate and develop in a coordinated manner, the digital economy not only enables faster and smoother information transmission but also enhances the cooperation capabilities among enterprises. As for how the digital economy promotes the linkage of industrial chains and supply chains in the western regions, the specific approaches mainly focus on two aspects: one is the practical application of digital technologies, and the other is to drive development through innovation. Firstly, big data technology, through real-time collection and in-depth analysis of data from each link of the industrial chain, realizes data visualization, significantly improving the transparency of the supply chain and the ability of risk warning, effectively promoting information sharing in the raw material supply, production processing, sales distribution and other links. Secondly, cloud computing provides timely and effective data resource support for enterprises in the western region, making cross-regional and cross-enterprise resource integration and collaborative management possible, reducing the spatial limitations and operational costs of information exchange. Moreover, the Internet of Things technology, through intelligent sensing devices connected to the network, realizes real-time perception and automatic control of supply chain nodes, significantly enhancing the intelligence level of the supply chain. Taking western characteristic industrial parks as an example, by building a digital collaborative platform, gathering data and technical resources from upstream and downstream enterprises, promoting the deep integration of R&D, production and market links, improving the integration degree of the industrial chain and the resilience of the supply chain, and forming a typical model of leveraging the digital economy to enhance regional competitiveness [7]. The application of these digital technologies has facilitated timely communication of information and optimized resource allocation, alleviating the problems of information lag and resource waste in traditional industrial and supply chain chains.

At the environmental level, digitization has brought about unprecedented visibility. Through IoT sensors and connected devices, the consumption and utilization of resources are no longer haphazard but can be monitored and measured in real time with precise data. This transparency enables enterprises to precisely identify the sources of waste and emissions and automatically optimize. The immutable data chain built by blockchain technology realizes precise traceability of resources from source production, terminal consumption to final recycling, providing a way for data visualization. Moreover, with the widespread application of smart contracts, enterprises can achieve full-process management through automatically executed electronic contracts, enabling precise resource allocation. This not only improves the efficiency of resource matching but also reduces resource consumption and environmental impact, achieving a dynamic balance of shared environmental risks and shared economic benefits [8].

On the economic front, digitization has led to a transformation from owning products to sharing capabilities and services. Data-driven flexible manufacturing capabilities have made supply chains more "flexible". Under the traditional model, enterprises often carry out batch production based on historical sales data and market forecasts. Once market demand suddenly changes, it is difficult for enterprises to quickly adjust their production plans, which can lead to situations such as insufficient supply of products, missing market opportunities, or excessive product accumulation and occupation of funds and storage space. By collecting real-time market demand data and inventory data of each link in the supply chain through digital technology, production parameters, raw material procurement plans and production schedules can be adjusted quickly, which improves the overall operational efficiency. Haier's launch of COSMOPlat is a typical case of how digitalization drives the development of the industrial chain and supply chain. This platform introduces an industrial internet platform that enables users to participate in the entire process of experience. Haier's "chain group contract" model and COSMOPlat, in essence, restructure enterprises into an open value co-creation network. The two jointly support the operation of a networked ecosystem [9]. This model achieves the synergy of organizational efficiency and user value through user demand-driven and chain group autonomous bidding, realizing the innovation of product design concepts directly participated by users. This production mode based on demand-driven effectively reduces resource waste caused by mismatch between supply and demand, making the entire economic model more adaptable to market fluctuations, with stronger resilience and higher operational efficiency.

At the societal level, the establishment of digital platforms enables different groups and market participants of various scales to share the development dividends more equally, breaking the geographical limitations on economic activities and becoming a direct link connecting producers in remote areas with global consumers. In the traditional agricultural supply chain, the characteristic agricultural products grown by small farmers in remote areas and the handicrafts

meticulously crafted by artisans often have to go through multiple layers of middlemen before reaching consumers. Each layer of middlemen adds a price increase, resulting in a significant reduction in the profits that producers ultimately receive, and consumers have to pay higher costs for these intermediary links. However, through platform economy via internet technology, small farmers and artisans can directly showcase and sell their products on the platform, allowing consumers to directly understand the origin of the products and the stories of the producers, achieving direct sales from the place of origin to the users. This not only reduces unnecessary intermediary links, reduces value loss, but also enables the producers creating value to obtain more benefits and makes the distribution of value more directly inclined towards labor and creation [10]. Digitalization of agricultural supply chains, such as blockchain and smart contracts, can solve the problems of information asymmetry, quality fraud, and trust loss in the agricultural product circulation process [11]. Table 3 shows a comparison of the multi-dimensional mechanisms of digital economy promoting the linkage of industrial chains and supply chains to promote sustainable development.

**Table 3** Comparison of Multi-dimensional Mechanisms of Digital Economy Promoting Industrial Chain and Supply Chain Linkage to Facilitate Sustainable Development

Dimension	Promotion Mechanism
Economic	Using big data to analyze market demand, reduce overproduction and stockouts, and lower inventory costs. Digital technology accelerates the integration of industrial chain and supply chain, optimizes resource allocation, improves the efficiency of manufacturing and logistics, and reduces costs and inventory.
Social	The agricultural product traceability system ensures food safety. In emergencies such as the epidemic, smart supply chains can efficiently dispatch living materials. E-commerce platforms help agricultural products from remote areas be sold across the country, increase farmers' income, and contribute to rural revitalization.
Environmental	Using digital twin technology to track the entire process of products from materials, production, use to recycling, facilitating classification, recycling, and reuse.

### 3 DIGITAL ECONOMY EMPOWERING INDUSTRIAL AND SUPPLY CHAIN UPGRADING IN WESTERN CHINA

However, the promotion effect of the digital economy on the linkage of industrial chains and supply chains in the western regions also faces many practical challenges. Firstly, the overall digital infrastructure construction in the western regions is uneven. The western regions have a vast territory and complex terrain, which leads to higher construction and operation maintenance costs for 5G base stations, fiber optic networks, and IoT facilities compared to the eastern regions. The "digital divide" phenomenon is significant. Even in the areas with infrastructure coverage, the network quality, the scale and efficiency of data platforms are relatively lagging, making it difficult to meet the strict requirements of modern industrial chains for real-time transmission, storage, and processing of massive data, resulting in a lack of a solid foundation for the digital perception and intelligent decision-making of supply chains. Secondly, the shortage of professional technical talents is prominent, and the supply of talents for digital technology development, application, and management is insufficient. The western regions are at a disadvantage in terms of attracting and retaining talents, lacking both compound talents who are proficient in industry knowledge and digital technology, and cutting-edge technical talents who can conduct big data analysis and develop artificial intelligence algorithms [7]. Moreover, there are inconsistent data standards and information silos among the industrial chains and supply chain enterprises in the western regions, and there is a lack of effective cross-industry data sharing platforms, which hinders the circulation and collaborative innovation of digital information. Finally, data sharing among government departments and between upstream and downstream enterprises in the industrial chain is difficult. Due to data security and privacy protection mechanisms, enterprises and governments face security risks in the data management process, which affects the initiative and reliability of information sharing. These constraints directly affect the effectiveness of the industrial chain and supply chain linkage mechanism stimulated by the digital economy.

The aforementioned analysis indicates that numerous challenges such as lagging digital infrastructure, weak foundation for industrial digitalization, and scarcity of high-end talents collectively restrict the enabling effect of the digital economy on the industrial and supply chain ("dual chains") in the western regions of China. However, it must be

recognized that the western regions are not a homogeneous whole. Different provinces within the region, due to differences in resource endowment, geographical conditions, and strategic positioning, exhibit significant differences in the paths and challenges of "dual chain" upgrading. Therefore, this paper selects Xinjiang as a sample for a further brief analysis.

The digital economy, as an important engine of economic development in the new era, holds profound strategic significance for Xinjiang to achieve sustainable development and the linkage of industrial chains and supply chains. Xinjiang is located in the northwest of China and is an important node in the "Belt and Road" initiative. The digital economy infrastructure is constantly improving, providing solid technical support for the deep integration of industrial chains and supply chains. In the current global context of digital transformation, by combining Xinjiang's unique geographical advantages and resource endowments, systematically studying the contradictions and synergies between sustainable development and the linkage of industrial chains and supply chains under the background of digital economy has important theoretical value and practical significance. Through in-depth analysis of the main contradictions and potential opportunities faced by Xinjiang, exploring effective paths for coordinated development, not only provides solutions for regional high-quality development, but also offers references and impetus for promoting the deep integration of digital economy and real economy in the western regions of China. Therefore, this article conducts a detailed analysis of how Xinjiang can achieve a balance and synergy between the linkage of the industrial chain and supply chain and sustainable development under the leadership of the digital economy; it examines the related contradictions and opportunities, and proposes policy suggestions and optimization paths, thereby promoting the green transformation and innovation upgrade of the regional economy.

At present, during the process of promoting the linkage of the industrial chain and supply chain in Xinjiang, multiple contradictions still exist and need to be addressed urgently. Firstly, the pressure on resources and the environment is quite prominent. Xinjiang has a dry and infertile climate, and its ecological environment is somewhat fragile. Moreover, with the continuous expansion of mineral energy development and industrial production, the problems of water scarcity and environmental pollution have become the key factors restricting its sustainable development [12]. Secondly, the uneven level of digital transformation is also one of the prominent contradictions. Although 5G networks have been fully covered in the central urban areas of Xinjiang prefectures, the digital infrastructure in remote areas is still not complete [13]. Moreover, the unsmooth logistics information and low transportation efficiency have become the weak links in the linkage of the industrial chain and supply chain, restricting the digital upgrading of industries and the speed of market response. These contradictions not only directly affect the overall efficiency of the industrial chain and supply chain, but also hinder Xinjiang's transformation from a resource-consuming type to a green and sustainable type, becoming the development bottlenecks that need to be solved urgently.

Based on the analysis in this section, in the face of the situation where the potential of digital economy development in Xinjiang and the linkage between the industrial chain and supply chain coexist, the future should focus on optimizing the following paths. First, it is necessary to strengthen policy support, improve the regulatory and policy framework for the digital economy, and accelerate the transformation and innovation of the green industry. Secondly, continuously enhance the construction of digital infrastructure, especially the computing power network and 5G coverage [13]. Third, formulate and improve green industrial chain and supply chain standards, promote full-process green and low-carbon management, and improve resource utilization efficiency. Fourth, build an efficient regional collaboration mechanism to achieve in-depth cooperation among upstream and downstream enterprises, government departments, and research institutions, forming a diversified and mutually beneficial linkage pattern. Finally, strengthen talent cultivation and the promotion of digital technology, enhance the digital capabilities of enterprises and the level of green transformation, strengthen the construction of digital talent teams, and provide sufficient human resources guarantee for the digital process in the western region [13]. These paths not only provide practical and feasible optimization solutions for the linkage of digital economy and industrial chain and supply chain in Xinjiang, but also lay a solid foundation for achieving the overall green and high-quality development goals of the western region, and have important promotion value and strategic significance.

#### 4 CONCLUSION

The interconnection between the industrial chain and the supply chain essentially means integrating the overall macro-level industrial planning with the daily operational management of individual enterprises, ultimately building a modern industrial system with greater risk-resistance capabilities, higher cooperation efficiency, and the ability to control key links independently. This effective interconnection plays a crucial role in the long-term development of the economy and society in the western region. Take the role of digital technology as an example. By optimizing the coordination of each link in the supply chain through digital technology, not only is the resource allocation more reasonable and unnecessary waste reduced, but in the long run, it also provides tangible assistance in protecting the environment. Through digital means to achieve precise monitoring and management, it helps to reduce carbon emissions and lower energy consumption, promoting the realization of the green development goals. On the other hand, enhanced resilience of the industrial chain and supply chain has improved the anti-risk capabilities of the supply chain and the industrial chain. Moreover, the industrial chain collaboration under the background of the digital economy helps to narrow the gap in industrial development levels between the western regions and the developed eastern regions, promotes balanced regional economic development, and enhances the economic anti-risk capacity and sustainable development potential of the entire western region.



Although the digital economy has become an important engine driving the linkage of regional industrial chains and supply chains in the western region, by optimizing the coordination of information flow, logistics and capital flow, it has significantly improved the overall efficiency and collaboration level of the industrial chain, and promoted resource optimization allocation, environmental protection, social equity. However, bottlenecks such as differences in digital infrastructure, imperfect coordination mechanisms and insufficient policy support still affect the coordinated development and sustainable progress of the industrial chain and supply chain in the western region. Only by combining comprehensive strategies such as strengthening infrastructure construction, deepening regional collaboration, improving financial support and promoting the application of green digital technologies, can the western region fully unleash the potential of the digital economy, achieve efficient integration of industrial and supply chain linkage, and promote the regional economy and society towards a green, high-quality and sustainable future.

## COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

## FUNDING

This study was supported by the Silk Road Economic Belt Core Area Industrial High-quality Development Research Center, Xinjiang Normal University Think Tank Bidding Project (ZK202326C); Research Outcomes Supported by the University Basic Scientific Research Operating Expenses Program (XJEDU2025J094).

## REFERENCES

- [1] Hao X, Wang X, Wu H, et al. Path to sustainable development: Does digital economy matter in manufacturing green total factor productivity?. *Sustainable Development*, 2023, 31(1): 360-378.
- [2] LIU N N, JIANG D H. Research on the Digital Economy Driving the Resilience Improvement of the Manufacturing Industry Chain in Western China. *China Journal of Commerce*, 2025, 34(12): 31-35. DOI: 10.19699/j.cnki.issn2096-0298.2025.12.031.
- [3] ZHANG X, CUI R M. Strategies for Embedding Western China into the New Development Pattern of 'Dual Circulation'. *Journal of Yunnan Minzu University (Philosophy and Social Sciences Edition)*, 2021, 38(3): 128-135. DOI: 10.13727/j.cnki.53-1191/c.2021.03.016.
- [4] W M Samanthi Kumari Weerabahu, Premaratne Samaranayake, Dilupa Nakandala, et al. Digital supply chain research trends: a systematic review and a maturity model for adoption. *Benchmarking: An International Journal* 2023, 30(9): 3040-3066.
- [5] Kamble SS, Gunasekaran A, Parekh H, et al. Digital twin for sustainable manufacturing supply chains: Current trends, future perspectives, and an implementation framework. *Technological Forecasting and Social Change*, 2022, 176: 121448.
- [6] Khan S A R, Godil D I, Jabbour C J C, et al. Green data analytics, blockchain technology for sustainable development, and sustainable supply chain practices: evidence from small and medium enterprises. *Annals of Operations Research*, 2025, 350(2): 603-627.
- [7] WANG Y Z, PU X C. Digital Economy and High-Quality Development in Western Counties: A New Economic Form and Development Model for County-Level Economies. *Data*, 2022(5): 44-46.
- [8] Zhang X, Liu C, Medda F. A smart-contract-aided plastic credit scheme. *IEEE Systems Journal*, 2022, 17(1): 1703-1713.
- [9] Ding, D. Case study on value cocreation mechanism of Haier COSMOPlat industrial internet platform. *Modern Marketing*, 2024(03): 1-3. DOI: 10.19932/j.cnki.22-1256/F.2024.01.001.
- [10] WANG J B, ZHANG L D. Research on the Adoption Strategy of Blockchain Traceability Technology in Contract Farming Supply Chains. *Systems Engineering — Theory & Practice*, 2024, 44(2): 612-628.
- [11] Caro Miguel Pincheira, Muhammad Salek Ali, Massimo Vecchio, et al. Blockchain-based traceability in Agri-Food supply chain management: A practical implementation. 2018 IoT Vertical and Topical Summit on Agriculture-Tuscany (IOT Tuscany). *IEEE*, 2018, 1-4. DOI: 10.1109/IOT-TUSCANY.2018.8373021.
- [12] ZHAO F. Research on Agricultural Resource Utilization and Economic Sustainable Development in Xinjiang. *Co-Operative Economy & Science and Technology*, 2025(8): 22-25. DOI: 10.13665/j.cnki.hzjjykj.2025.08.011.
- [13] ZUO S. Development Strategies for the Digital Economy in Xinjiang under the "Dual Circulation" Pattern. *Contemporary County-Level Economy*, 2024(8): 31-33. DOI: 10.16625/j.cnki.51-1752/f.2024.08.011.