Economics, Law and Policy
ISSN 2576-2060 (Print) ISSN 2576-2052 (Online)
Vol. 7, No. 1, 2024
www.scholink.org/ojs/index.php/elp

Original Paper

Research on the Role of the Digital Economy in the Modern Logistics Industry

Zichen Wang[1]

[1] University of Shanghai for Science and Technology, Shanghai, China

Received: May 6, 2024 Accepted: June 15, 2024 Online Published: June 17, 2024

doi:10.22158/elp.v7n1p173 URL: http://dx.doi.org/10.22158/elp.v7n1p173

Abstract

The world has entered an era of digital economy, and China's logistics industry is accelerating its digital transformation to promote the upgrading of industrial structure, enhance safety and efficiency, improve service quality, optimize user experience, and ultimately drive intelligent transformation. Furthermore, in response to the current state of digital logistics, this paper proposes optimization and innovation policies such as strengthening the training of logistics innovation technical personnel, enhancing the economic infrastructure of digital logistics, and promoting deep integration between the digital economy and logistics industr -to enrich logistic theory under the digital economy and promote high-quality development of contemporary logistics industry.

Keywords

Digital Economy, Smart Logistics, Logistics Industry, Digital Era, Development

1. Introduction

With the rapid development of global e-commerce and internet industry, logistics industry-as an indispensable part-also follows its development. The logistics industry is a new emerging industry in contemporary society, and its importance and vitality in contemporary society has great potential for future development. The world has entered an era of digital economy, artificial intelligence, blockchain technology and cloud computing and other digital technologies have been used in all walks of life, the logistics industry is also entering a period of digital transformation: the traditional logistics industry should be adjusted in a timely manner, better integration with digital technology to promote the development of each other. This paper mainly studies the current situation of the logistics industry's demand for digital economy technology in the era of digital economy, explores the role of digital economy in the modern logistics industry, gives the logistics industry optimization and innovation countermeasures in the era of the digital economy, and puts forward good policy recommendations to

promote the accelerated and high-quality development of the logistics industry.

2. Definition of the Digital Economy and the Current Status of Its Development

The digital economy is a new economic form following the agricultural and industrial economies. The digital economy refers to a series of economic activities that use digitized knowledge and information as the key production factors, modern information networks as the important carriers, and the effective use of information and communication technologies as the important driving force for efficiency enhancement and the optimization of the economic structure, and it is a new economic form that promotes the greater unity of equity and efficiency. The digital economy is developing at a fast pace, radiating widely and influencing profoundly, constantly pushing forward profound changes in the modes of production, living and governance, and becoming a key force in reorganizing global factor resources, reshaping the global economic structure and changing the pattern of global competition. The Digital China Development Report (2023) suggests that with the joint efforts of all regions and departments, positive progress will be made in the construction of Digital China in 2023. The pace of data foundation system construction has accelerated, and a national data work system with up-and-down linkage and horizontal synergy has initially taken shape. The digital infrastructure has been expanding and speeding up, and the total scale of arithmetic power has reached 230EFLOPS, ranking second in the world; key core technologies such as advanced technology, artificial intelligence, 5G/6G and other key core technologies have been making breakthroughs, and high-performance computing has continued to be in the first echelon in the world. The data factor market has become increasingly active, with total data production amounting to 32.85ZB, a year-on-year increase of 22.44%. 2023 saw China's digital economy maintain steady growth, with the added value of core industries in the digital economy accounting for 10% of GDP, and as of 2024, the scale of China's digital economy market continues to expand, accounting for an increasing proportion of China's GDP, which signifies that the digital economy's national economic proportion has been increasing, and has become an important force driving economic growth in China in the new era.

3. Analysis of the Current Situation of China's Logistics Industry in a Digital Context

The logistics industry is rapidly advancing its digital transformation, enhancing logistics efficiency and service quality through technologies such as the Internet of Things, big data, and artificial intelligence. Since 2010, express logistics enterprises have extensively established big data application platforms, such as the Cai Niao supply chain control tower, to enable data-driven operations through functions like panoramic vision, abnormal alarm systems, and intelligent diagnosis. In 2023, the number of newly established digital logistics enterprises exceeded 5,900, marking a nearly 12% increase compared to 2022. Additionally, in 2023 there will be a total of 1,647 new digital logistics projects accounting for approximately 54.77%, with specific focus on big data (1,947 projects) and Internet of Things technology (1.736 projects). The penetration rate of digital logistics projects is projected to reach

49.5% in 2023-an increase of 12.5% from the previous year. SF Express continues to lead scientific and technological innovation by launching a digital twin platform in order to establish a highly accurate virtual representation of real-world scenarios within the logistic process using intelligent algorithms for optimization strategies and algorithm development research. The ongoing acceleration of digital transformation within the logistics industry provides robust support for high-quality development while continuously improving overall quality and efficiency.

4. An Exploratory Analysis of the Role of the Digital Economy in the Modern Logistics Industry

4.1 Digital Economy Promotes Green Development of the Logistics Industry

The digital economy promotes the green and sustainable development of the logistics industry. The application of digital technologies such as the Internet of Things, big data analysis, artificial intelligence, cloud computing, etc., makes the logistics system more reasonable and efficient, reduces the non-essential invalid transportation and the use of transportation means of time, which reduces the energy consumption and air pollution; the digital economy technology makes the warehousing of the logistics industry more and more intelligent and automated, for example, the application of Internet of Things sensors makes the warehouse temperature, humidity, etc. monitored in real time, which helps to reduce the waste of goods and the energy consumption of transportation; the use of digital economy technology optimizes the warehouse layout and transportation route of the logistics system. The application of Internet of Things sensors the transportation of fruits and vegetables, for example, making it possible to monitor the temperature and humidity of the warehouse in real time, thus helping to reduce the waste of goods and transport energy consumption; the use of digital economy technology makes the logistics system optimize the layout of warehousing and transportation paths, so that the goods can arrive at their destinations faster and more efficiently, reduce the number of unnecessary transportation links, shorten the transport path, thus reducing the energy consumption of transportation means and reducing the pollution of the environment. In the era of digital economy, green logistics technology is more and more widely used in the logistics industry, new energy electric vehicles, hydrogen cars gradually replace traditional oil vehicles, new energy trucks are gradually used in the logistics industry, such as the use of Tesla Semi electric trucks, making the global automobile emissions reduced, which contributes to environmental protection. At the same time, big data analysis technology contributes to the development and optimization of green packaging technology in the logistics industry, which reduces the damage to the environment caused by traditional logistics packaging materials; the application of digital economy technology improves the synergy and visibility of the supply chain. Cloud data storage technology enables real-time sharing of data and information between the supply chain, improves the responsiveness and operational efficiency of the whole supply chain, enables timely and accurate transmission of information, reduces the risk of logistics transportation and storage process, and then reduces energy loss, which contributes to the green and sustainable development of the logistics industry.

4.2 The Digital Economy Promotes the Upgrading of the Industrial Structure of the Logistics Industry

The digital economy optimizes the original allocation of resources in the logistics industry, the introduction of the Internet, artificial intelligence, big data and other digital technologies can optimize the allocation of resources in the logistics industry, promoting the transformation of the logistics industry towards digital intelligence, the digital economy will prompt the interconnection of different industries, which will help to eliminate the asymmetry of information between different industries, and promote the linkage of independent industries to each other to eliminate barriers, which will in turn help to improve the entire industry chain, making it more efficient and rational. This will help improve the whole industry chain and make resource allocation more efficient and reasonable.

The digital economy has optimized the industrial model of the logistics industry from all aspects. On the one hand, the reference of digital technology optimizes the management mode of logistics enterprises, which use big data and cloud computing technology to establish an intelligent management system to realize the intelligent scheduling and optimal allocation of resources such as orders, inventories, vehicles, etc., which improves the efficiency of logistics; at the same time, the introduction of intelligent logistics equipment and robots enables logistics enterprises to realize the automation of part of the manual labor, further improving the logistics efficiency. On the other hand, the reference of digital technology optimizes the transmission of logistics information such as the location and status of goods and improves the transparency of logistics. Users and companies are able to query the courier information at any time, reducing the information asymmetry of logistics information, and the application of artificial intelligence technology also makes the processing of logistics information more automated.

The digital economy meets the consumer demand in the process of intelligent transformation of the logistics industry, and the digital economy has largely changed the behavior of consumers, and big data can accurately push recommended products according to the online shopping habits of consumers as well as recommend the same type of products with different price levels according to the historical consumption ability of consumers, and consumers will enhance the possibility of purchasing goods because of the accurate push of big data, therefore, the application of digital technology indirectly has a positive impact on the logistics industry. For logistics companies, the application of big data can more closely match the individual needs of consumers and consumption tendencies, each consumer can obtain personalized services, the overall service experience of consumers continues to improve, so that the digital economy can meet the consumer demand in the process of intelligent transformation of the logistics industry.

4.3 The Digital Economy Enhances the Safety and Timeliness of the Logistics Industry

The advancement of digital logistics facilitates the utilization of Internet of Things, big data, and other technologies by logistics enterprises to conduct real-time monitoring and management of storage, transportation, and delivery processes. This ensures the security of logistics goods at every stage, significantly reduces the risk of damage and loss, and guarantees overall logistics security. Logistics

enterprises employ big data technology to analyze historical data from various countries and regions, capturing information such as traffic patterns, human geography factors, and environmental conditions. This enables them to effectively plan and predict transportation routes for logistics goods in real time while minimizing potential risks.

In order to address the constant risk of information leakage and loss due to the large volume of data in the industry, logistics enterprises ensure secure information storage through encryption, protection measures, backup systems, and other digital security technologies. Additionally with big data analysis and artificial intelligence technology support, logistics enterprises establish an intelligent distribution system that automatically optimizes distribution modes based on real-time weather conditions, traffic situations, and environmental factors ensuring timely delivery.

Furthermore, the use of automated processing technology such as robot sorting in warehouse management reduces labor costs and improves speed accuracy thus enhancing timeliness. Logistics companies use big data analysis technology to analyze the logistics order demand in different months, different holidays and different regions in previous year, so to predict future demands and carry out capacity planning resource allocation in advance enabling them to prepare calmly ensuring timeliness.

4.4 The Digital Economy Improves Service Quality and Optimizes User Experience in the Logistics Industry

The application of digital economy technology in the logistics industry has optimized the service mode of the logistics industry, and digital technology has made the service of logistics more personalized for different users, so that different needs of users can be met. Compared with the traditional logistics service mode, users can choose a more favorable transportation mode, receiving mode and payment mode in the mini program, which greatly improves user experience. Logistics companies continue to analyze and excavate the collected data to better understand the different behavior patterns of all users, provide personalized logistics services, increase user stickiness and satisfaction, and improve their own competition in the logistics industry. The application of artificial intelligence in the logistics industry enables logistics enterprises to create their own intelligent online robots, which can answer and deal with questions at any time according to customers' questions, establish a good communication channel between enterprises and customers, and improve users' trust and satisfaction with enterprises. Internet of Things technology enables enterprises to locate and monitor logistics goods in real time, and predict the more accurate arrival time, customers can also monitor and browse the status of logistics goods in real time, check the estimated arrival time of goods, compared with the unknown status and location of traditional logistics goods. The Internet of Things technology, to a large extent, optimizes the users' experience.

4.5 Digital Economy Promotes Intelligent Transformation of the Logistics Industry

The intelligent logistics industry refers to the transformation of traditional logistics into "Internet + logistics". Logistics enterprises integrate Internet of Things information and other technologies to establish a smart integrated platform for logistics enabling intelligent warehousing, delivery,

transmission, and receipt processes. This facilitates high-quality and efficient collaboration among various units within the logistics system. The digital economy drives the digital and intelligent transformation of the industry by efficiently integrating and analyzing data in the logistics process plus enhancing information visualization. Enterprises can make informed logistic decisions through data analysis, leading to automation and intelligence in the industry. The digital economy introduces new models such as self-service delivery machines, campus automatic delivery robots, drone delivery, shared truck warehouses etc., providing momentum for the industry's intelligent transformation. Additionally, globalization is a characteristic of the digital economy which promotes resource sharing among global logistics enterprises through technology exchange.

5. The Demand Analysis of Logistics Industry for Digital Economy and Its Current Inadequacy

5.1 Data Security and Technical Standards and Specifications

With the continuous development of the digital transformation of the logistics industry, a large amount of private data such as transaction data, user information, address information, supply chain data and other private data are collected and left on file, data leakage and customer privacy leakage have become a potential threat, and the huge information system of the logistics enterprise is always at risk of being maliciously attacked and information leakage, so strengthening data security is the key to the transformation of the logistics industry into a digital and intelligent one, and logistics enterprises should establish a more sound data security management system, develop complete data security processes and policies, and set up a professional and experienced security team to provide more security for the logistics industry in the era of digital economy.

Compared with the traditional logistics industry, the logistics industry in the era of digital economy needs more perfect technical standards and management norms, and the central government should set up relevant industry laws and regulations in a timely manner. Non-uniform technical standards and norms will make the market chaotic, supply chain inefficiency, increase the difficulty and cost of cooperation between enterprises, and even bring security risks and other problems. Logistics industry associations and organizations should take the initiative to participate in the development of industry technical standards and norms, so that the domestic norms and international norms adapt to the relative connection, logistics enterprises should also take the initiative to comply with the standards and norms set up by the industry, in accordance with the relevant laws and regulations.

5.2 Refinement of the Talent Structure in Digital Logistics

With digital transformation of the logistics industry, the human resource structure within the logistics industry has changed dramatically, some traditional manual positions have been replaced or removed, the industry needs more technical logistics talents, the logistics industry needs to invest more time and capital to cultivate technical and innovative talents, expand the talent pool of digital logistics, and make up for the gap in the supply of technical talents in the logistics industry in the era of digital economy. Regions with different levels of development should set up relevant policies and benefits to attract

skilled logistics talents, to ensure a balanced digital transformation of the logistics industry between regions and to avoid brain drain.

5.3 Green Logistics and Sustainable Supply Chain Management

The logistics industry in the era of digital economy should utilize big data, the Internet and other technologies to reduce the damage to the environment caused by logistics, incorporate the ESG system into its own new standards, reduce energy waste and packaging pollution, and pay more attention to green and low-carbon logistics methods. Logistics enterprises should pay attention to the sustainability of the supply chain between themselves, their customers and their suppliers, so as to reduce the cost of their own operations and enhance their competitiveness and development stability.

6. Logistics Industry Optimization and Innovation Countermeasures Based on Digital Economy

6.1 Enhance the Training of Technical Personnel in Logistics

Digital technology and logistics enterprises complement each other and promote each other's development, the logistics industry through the introduction of digital technology continues to develop in high quality, so it is urgent to cultivate logistics professionals who are proficient in digital technology, colleges and universities should respond to the changes of the times, promote the school curriculum and the modern industry in line with the focus on the cultivation of composite talents who have digital skills and professional knowledge of logistics. At the same time, the state should give more financial support to colleges and universities to promote the construction of the relevant professional curriculum system in colleges and universities, and local governments should formulate policies for the introduction of digital talents in the logistics industry as well as bonuses and benefits, etc., so as to inject more energetic and innovative scientific and technological talents into the logistics industry, and to make up for the shortage of talents in the logistics industry in the era of the digital economy.

6.2 Strengthen the Infrastructure of Digital Logistics Economic, Facilitate the Deep Integration of Digital Economy and Logistics Industry

Local governments should accelerate the construction of digital infrastructure, and accelerate the deployment and setup of a new generation of intelligent facility systems, such as setting up logistics information platforms, cloud computing and big data centers. Promote the digital transformation, intelligent transformation of national publicized facilities, create an all-round upgraded efficient, high-speed transportation system, use artificial intelligence, big data, cloud computing, the Internet and other technologies to realize the digital and automated management of the logistics industry, and continue to promote the development of the deep integration of the digital economy and the logistics industry.

6.3 Promote the Development of Intelligent Logistics

Implement the "Internet +" strategy: encourage logistics enterprises to apply modern information technologies such as the Internet, big data and artificial intelligence to establish an intelligent logistics system, optimize the organization of logistics and transportation, and improve the efficiency of

logistics and transportation, such as adopting AI algorithms to carry out the intelligent allocation of orders, transportation path planning and intelligent prediction of traffic congestion to further improve logistics efficiency and management level. Support logistics technology innovation, encourage enterprises to increase investment in automation, intelligent logistics equipment and information technology research and development, to enhance the intelligent level of logistics operations, such as in pet transportation, adding sensors, trackers, temperature detectors and other equipment connected to the user's cell phone terminal, so that the user can use the Internet technology to observe the pet's health and vital signs in real time, so as to achieve the development of intelligent logistics.

6.4 Promote the Popularization of Digital Logistics Technology

In order to promote the promotion and popularization of digital technology in small and medium-sized cities, and comprehensively promote the digital transformation of logistics, local governments can set up a special fund to vigorously promote the digital transformation of small logistics enterprises in rural and non-developed areas, so that they can break the threshold of digital transformation and narrow the digital technological gap between enterprises; logistics enterprises should strengthen the training and exercise of employees in digital technology, so that they can better learn and adapt to digital tools and software, and improve the overall technological capabilities of enterprises; the media should increase the promotion of digital logistics for users, so that users of different ages can better understand, adapt to, and use digital logistics technology, and promote the digitalization of logistics industry. Logistics enterprises should strengthen the training and exercise of employees in digital technology, so that they can better learn and adapt to digital tools and software, and improve the overall technological capabilities of the enterprise; the media should increase the promotion of digital logistics to users, so that users of different ages can better understand, adapt to, and use the digital logistics technology, and promote the digital transformation of the logistics industry.

7. Conclusion

The rapid development of the digital economy has injected a new "living water" and a new "energy" into the modern logistics industry. The logistics industry should keep up with the pace of the digital economy, seize the new opportunities empowered by the digital economy, meet the new challenges, and strive to realize the digital transformation and industrial change, and make positive contributions in the wave of promoting the digital transformation of the global economy, and continue to strive for the digital economy to drive the high-quality development of China's economy.

Reference

Dong, H. F. (2024). Analysis of the impact of digital economy on the high-quality development of China's logistics industry. *China Business Review*, (01), 106-109.

Khalid, A., & Russell, G. (2016). Impacts of Logistics Sprawl on the Urban Environment and Logistics: Taxonomy and Review of Literature. *Journal of Transport Geography*, *12*(57). https://doi.org/10.1016/j.jtrangeo.2016.08.009

Lazarini, J. G. O. C., Wollenberg, A., Lazarini, J. J. C. et al. (2023). The development of renewable energies and green logistics: Reflections on three countries in Latin America. *Journal of Advanced Management Science*, 11(3), 84-90. https://doi.org/10.18178/joams.11.3.84-90

Lee, C. C., Tang, M. T., Lee, C. C. (2023). Reaping digital dividends: Digital inclusive finance and high-quality development of enterprises in China. *Telecommunications Policy*, *47*(2), 1-17. https://doi.org/10.1016/j.telpol.2022.102484

Liu, C., & Cui, X. (2024). Research on the Impact and Mechanism of Digital Economy on the High-Quality Development of China's Logistics Industry. *Empirical Testing Based on Panel Data from 31 Provinces in China*, (10), 85-91.

Liu, S. J., & Liu, C. Y. (2024). Challenges and countermeasures of logistics enterprises in the transformation of network freight from the perspective of digital economy. *Logistics Science & Technology*, (09), 42-45.

Luo, Q., Cui, G. F., Xia, R., & Han, X. (2022). Coordinated development of digital logistics, economic growth and ecological environment. *Logistics Technology*, (10), 53-57.

Luo, R., & Wang, Q. M. (2022). The impact of China's urban digital economy on the high-quality development of logistics industry. *Urban Issues*, (06), 35-46.

Sun, X. Y. (2024). Research on the high-quality development of smart logistics empowered by digital economy. *Logistics Science & Technology*, (06), 73-75.

Tu, G., & Huang, J. Z. (2024). Research on the impact of digital economy on the high-quality development of logistics industry. *Logistics Science & Technology*, (05), 20-23, 32.

Zhong, M. Y. (2024). Impact analysis of digital economy empowering the development of smart logistics. *Railway Procurement and Logistics*, (05), 45-47.

Zhong, X. R. (2024). The impact of digital economy on the industrial upgrading of logistics industry. *China Storage & Transportation*, (03), 157-158.