Journal of Service Science and Management, 2025, 18(5), 333-338
https://www.scirp.org/journal/jssm
ISSN Online: 1940-9907
ISSN Print: 1940-9893

Research on Optimization Strategies for Agricultural Product Logistics and Transportation Systems in the Context of Big Data

Yang Wang

Research Office, Baoding University, Baoding, China
Email: hbyyjjz@126.com

How to cite this paper: Wang, Y. (2025). Research on Optimization Strategies for Agricultural Product Logistics and Transportation Systems in the Context of Big Data. *Journal of Service Science and Management, 18,* 333-338.
https://doi.org/10.4236/jssm.2025.185021

Received: September 8, 2025
Accepted: October 18, 2025
Published: October 21, 2025

Abstract

With the continuous advancement of information technology, the scope of big data applications has been expanding, providing significant convenience to both production and daily life, and promoting the development of China's agricultural product logistics and transportation system. In the big data environment, the agricultural product logistics and transportation system faces various challenges, but also encounters new opportunities. This paper addresses the issues present in the agricultural product logistics and transportation system under big data conditions and proposes optimization strategies, including: increasing government financial support for the agricultural product logistics and transportation system; improving logistics infrastructure for agricultural products; strengthening the construction of logistics infrastructure; optimizing information systems for agricultural product logistics and transportation; and advancing the informatization of agricultural product logistics.

Keywords

Big Data, Agricultural Products, Logistics Transportation System, Optimization

1. Introduction

In the era of big data, the logistics and transportation system for agricultural products is progressively transitioning from traditional dependence on manual labor and experiential practices to a more informatized, automated, and intelligent framework. The adoption of big data technology can markedly enhance both the efficiency and the management standard of agricultural logistics and transportation

systems. By leveraging big data analytics, it is possible to monitor and optimize key aspects such as transportation routes, warehouse management, and distribution planning in real time, thereby increasing logistics efficiency, reducing transportation costs, and minimizing loss rates (Zhang, Zhao, & Bi, 2022). Optimization of the agricultural logistics and transportation system in the context of big data effectively improves operational efficiency, lowers costs, enhances service quality, and supports the sustainable development of the agricultural economy.

2. Problems in the Agricultural Products Logistics and Transportation System under the Big Data Environment

1) Insufficient financial support for the agricultural product logistics transportation system

In the context of big data, the development of the agricultural product logistics transportation system requires policy direction and effective regulatory oversight. However, supervision of logistics transportation spans multiple departments, with overlapping responsibilities and a lack of unified policy support, leading to delayed management, resource wastage, and insufficient capacity to meet the growing logistics demand. Moreover, the development of the agricultural product logistics transportation system necessitates substantial capital investment. Currently, both governmental and enterprise investment in logistics infrastructure is inadequate, particularly regarding cold chain transportation equipment, storage facilities, and information systems, resulting in low logistics efficiency, high transportation costs, and elevated loss rates. Additionally, the underdeveloped logistics infrastructure and incomplete transportation networks in rural areas further exacerbate the challenges in logistics transportation (Zhou, 2022).

2) The basic infrastructure for agricultural product logistics and transportation is weak

The infrastructure supporting China's agricultural product logistics system remains weak, with insufficient investment, absence of industry standards, outdated and incomplete supporting facilities, and low degrees of modernization and informatization. Logistics and transportation conditions are rudimentary, leading to extended transportation times for agricultural products. Furthermore, inadequate transportation facilities in rural areas directly undermine the overall efficiency and reliability of smart logistics systems. In numerous remote regions, poor road quality, low road network density, and limited coverage by railway and air transport further contribute to increased transportation time and costs for goods.

3) Insufficient specialized talent teams

Currently, the workforce involved in agricultural product logistics and transportation is predominantly composed of farmers, who generally possess relatively low educational attainment and have limited knowledge of information technologies such as big data and e-commerce. As a result, intelligent technologies like big data are hindered from realizing their full potential within the agricultural product logistics and transportation sector. Furthermore, many enterprises in this

industry fail to prioritize the training and recruitment of professional and technical personnel, which, to a certain extent, constrains the development of the agricultural product logistics and transportation system.

3. Optimization Strategies for the Agricultural Product Logistics and Transportation System under the Big Data Environment

1) Increase government financial support for the agricultural products logistics and transportation system

Currently, numerous issues persist within China's agricultural product logistics and transportation system, a situation that is partially attributable to the insufficient financial support from the government for this sector. The government should actively encourage both social and private capital to participate in the agricultural product logistics and transportation domain, thereby providing essential funding for the system's development. In terms of financial assistance, the adoption of measures such as tax incentives, loan interest subsidies, and investment grants can effectively promote the growth of the agricultural product logistics and transportation system, guiding social and private capital into this field (Zhao, 2018). Additionally, the government may establish relevant laws and regulations to regulate the agricultural product logistics and transportation market, thereby reducing market transaction risks and fostering the healthy development of the agricultural product logistics and transportation sector.

2) Strengthen the construction of agricultural products logistics and transportation infrastructure

In the context of big data, optimizing the agricultural product logistics and transportation system relies on robust infrastructure. Therefore, enhancing the construction of agricultural logistics and transportation infrastructure under big data conditions is a critical issue that warrants careful consideration. First, infrastructure planning for agricultural product logistics and transportation should be aligned with the development status and characteristics of big data technologies to improve overall logistics efficiency (Hu, 2016). Second, it is essential to introduce advanced equipment and technologies, such as the Internet of Things and artificial intelligence, into the logistics and transportation processes. Simultaneously, emphasis should be placed on the scientific and rational planning of supporting infrastructure. During the planning phase, analysis and evaluation of the economic benefits of logistics infrastructure are necessary to enable effective improvements. Finally, when constructing agricultural product logistics infrastructure, considerations such as safety, environmental protection, and feasibility should be incorporated into the planning process.

3) Optimize the agricultural products logistics and transportation information system

In the context of the big data era, achieving the efficient development of the agricultural products logistics and transportation system requires the implemen-

tation of information-based and digital management, as well as the establishment of an information system dedicated to agricultural product logistics and transportation (Sun & Bo, 2017). First, the construction of the information platform should prioritize data analysis and processing to provide robust data support for the development of the logistics and transportation system and to inform management decisions. Second, it is essential to strengthen information security within the system to protect personal privacy associated with agricultural product logistics and transportation. Finally, emphasis should be placed on the application and promotion of the information platform during its construction. To realize efficient development of the agricultural products logistics and transportation system in a big data environment, it is imperative to establish a comprehensive information system, enabling comprehensive management and monitoring of the logistics and transportation process, thereby enhancing the operational efficiency of the entire system.

4) Promote the informatization of agricultural product logistics construction

Advancing the informatization of agricultural product logistics constitutes a key pathway for optimizing the agricultural product logistics and transportation system. This process requires the concerted efforts of both government and enterprises. At the governmental level, it is essential to increase investment in agricultural product logistics information systems, continuously improve associated infrastructure, and provide the necessary material support for the development of informatized logistics (Zhou & Zhang, 2016). Enterprises, in turn, should actively adopt advanced information technologies, establish comprehensive information platforms, and strengthen research and development of agricultural product logistics information systems (Wang, 2020). Under the big data environment, promoting informatization in agricultural product logistics represents a systematic undertaking. In this context, it is vital to fully exploit the advantages of big data technology in agricultural logistics, intensify research and development in big data applications, and accelerate the processes of product intelligence and standardization (Du & Zhang, 2019). Through the joint efforts of government and enterprises, a comprehensive information platform can be established to enable data sharing, resource integration, and technological exchange.

5) Implement specialized talent team development

First, the government should provide training for agricultural product logistics and transportation personnel to enhance their understanding of the importance of optimizing the logistics and transportation system within a big data environment, clarify the developmental direction of the system under such conditions, and improve practitioners' awareness of relevant system optimization (Chen & Liu, 2021). Second, the government should implement talent recruitment policies to attract top big data professionals into the agricultural logistics and transportation sector, as well as reward individuals who make outstanding contributions to the industry in the context of big data. Finally, enterprises should prioritize the development of their talent pools by formulating training plans tailored to the

specific circumstances of the organization. For employee training, enterprises should conduct regular programs to equip staff with knowledge of big data technologies and information processing methods (Rejeb, Rejeb, & Zailani, 2021). Regarding performance assessment, enterprises should establish reasonable performance evaluation systems to enable employees to maximize their value in the workplace.

4. Conclusion

In the context of big data, the agricultural product logistics and transportation system faces both opportunities and challenges. Analyzing and addressing these issues is essential to advancing the development of China's agricultural product logistics and transportation system. Accordingly, the following optimization strategies are proposed: increasing government financial support for the agricultural product logistics and transportation system; improving agricultural product logistics and transportation infrastructure; strengthening the construction of logistics and transportation infrastructure; optimizing the agricultural product logistics and transportation information systems; and promoting the informatization of agricultural product logistics. Overall, while China's agricultural product logistics and transportation system has made considerable progress in the era of big data, a gap remains compared to developed countries. To further promote development, it is necessary to continually improve big data technologies and enhance their application in agricultural product logistics. The government should intensify its financial support for the logistics and transportation system, vigorously advance the application of big data technologies within agricultural product logistics, and concurrently improve the construction of agricultural information infrastructure in the environment of big data to foster agricultural modernization. Additionally, greater emphasis should be placed on the promotion of big data technologies in agriculture and the cultivation of professionals skilled in this field, in order to accelerate the modernization and informatization of China's agriculture. It is anticipated that, under the influence of big data, the development of China's agriculture will ascend to a new level.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Chen, X., & Liu, Z. (2021). The Choice of Multimodal Transport Mode of Agricultural By-Product Logistics in the Land-Sea New Corridor in Western China Based on Big Data. *Wireless Communications and Mobile Computing, 2021,* Article ID: 1880689. https://doi.org/10.1155/2021/1880689

Du, J., & Zhang, Z. (2019). Application of Big Data in Agricultural Product Logistics—Based on the Study of Binzhou Agricultural Product Logistics. *Economic Research Guide, No. 18,* 39+45.

Hu, Y. (2016). Challenges and Development Trends of Agricultural Product Logistics in

China under the Background of Big Data. *Reform & Strategy, 32,* 30-32+111.

Rejeb, A., Rejeb, K., & Zailani, S. (2021). Big Data for Sustainable Agri-Food Supply Chains: A Review and Future Research Perspectives. *Journal of Data, Information and Management, 3,* 167-182. https://doi.org/10.1007/s42488-021-00045-3

Sun, Y., & Bo, J. (2017). The Transformation and Development Direction of Agricultural Product Logistics in China under the Background of Big Data. *Contemporary Economy, No. 6,* 80-81.

Wang, J. (2020). Construction of Long-Distance Logistics Networks for Fresh Agricultural Products under the Background of Big Data. *Business Economics Research, No. 7,* 112-115.

Zhang, J., Zhao, P., & Bi, R. (2022). Research on Agricultural Product Logistics Management Based on Big Data Technology. *Journal of Agricultural Mechanization Research, 44,* 216-220.

Zhao, J. (2018). Research on the Application of Big Data in Agricultural Product Logistics in China. *Journal of Zhengzhou Railway Vocational and Technical College, 30,* 8-11.

Zhou, D. (2022). Research on the Development of Smart Agricultural Product Logistics in the Era of Big Data. *Shanxi Agricultural Economy, No. 3,* 166-168.

Zhou, H., & Zhang, H. (2016). Research on the Integration of Agricultural Product Logistics Based on Big Data. *Cooperative Economy and Science & Technology, No. 6,* 56-57.