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Approaches to Supply Chain Logistics Cost Optimization

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Abstract: With the advancement of global economic integration, supply chain management, as one of the key factors for enterprises to gain competitive advantages, has received more and more attention from both academic and practical circles. Logistics, as one of the core links in the supply chain, directly affects the operation cost and service quality of enterprises. Logistics cost is not only an important part of the enterprise cost structure but also a factor that cannot be ignored in the process of improving the overall efficiency and competitiveness of enterprises. Therefore, how to optimize supply chain logistics costs has become a key issue in modern supply chain management. In recent years, many scholars have carried out a lot of research on supply chain logistics cost optimization. The research covers a variety of aspects from transportation cost optimization, inventory management, and transportation path optimization to intelligent logistics management based on information technology. The purpose of this paper is to review the research progress in the field of supply chain logistics cost optimization in recent years, analyze the mainstream viewpoints, methods and their applications of existing research, and discuss the future research direction.

Keywords: Supply Chain Management, Logistics Cost Optimization, Cost Reduction Strategies, Efficiency Improvement, Transportation Management, Warehouse Optimization.

1. Introduction

In the wave of globalization, supply chain management has become a decisive factor for competitive differentiation in the global market. As the core of the supply chain, logistics management has a direct impact on the operation cost and service quality of enterprises and has become a key battlefield to enhance the competitiveness of enterprises. However, the traditional logistics model has become increasingly difficult to meet the needs of modern enterprises under the challenge of rapid technological progress and changes in market demand, which requires a shift to a more dynamic and integrated logistics management approach.

This paper provides a comprehensive review of domestic and international research on supply chain logistics cost optimization strategies. The article takes an in-depth look at the various components of transportation, warehousing, and inventory management, highlights typical cost inefficiencies, and explores strategies to reduce these expenditures. Logistics cost optimization goes beyond simple cost-cutting; it requires a deep understanding of the synchronization between logistics operations and overall business strategy in order to better respond to the market and improve customer service quality.

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Special attention is paid to the role of emerging technologies such as artificial intelligence, blockchain and advanced data analytics in transforming logistics practices. These technologies are expected to increase transparency, speed, and efficiency in the logistics process, leading to sizable cost savings and service improvements. In addition, the review explores the strategic alignment of logistics with corporate goals, emphasizing that optimizing logistics not only reduces operational costs, but also supports strategic initiatives such as market expansion, customer satisfaction, and sustainability.

By synthesizing findings from several studies, this paper assesses the actual impact and potential value of different logistics cost optimization strategies. The aim is to provide a solid framework for academics and practitioners to provide new perspectives and directions for future research and practical applications in the field of logistics and supply chain management.

2. Overview of the current state of supply chain logistics

According to the Action Plan for Effectively Reducing the Logistics Cost of the Whole Society issued by the General Office of the Central Committee of the Communist Party of China (CPC) and the General Office of the State Council in November 2024, supply chain cost optimization has been listed as an important initiative to promote high-quality economic development. The document proposes to strive to reduce the ratio of total social logistics costs to GDP to about 13.5% by 2027 through optimization of logistics structure, efficiency improvement, and policy support, so as to significantly reduce the constraints of logistics costs on enterprises and economic development. In terms of specific objectives, the ratio of China's total social logistics costs to GDP in 2022 will be 14.6%, down 0.2 percentage points from the previous year, but there is still room for optimization compared with developed countries. The document clearly puts forward to gradually reduce the cost of transportation, warehousing, management and other logistics costs by deepening the reform of railroad freight transport, promoting multimodal transport mode and promoting the innovative application of supply chain and other measures. From the perspective of logistics cost structure, transportation cost is still the largest part, accounting for about 60% of the total cost of logistics. Through the promotion of direct rail freight trains, optimization of “public to rail” “public to water” and other measures, can significantly reduce the cost of medium and long-distance transport, and improve the efficiency of cargo transportation. Warehousing costs accounted for about 15%, the document mentioned that the construction of large logistics hubs and distribution centers, promotes the digital transformation of warehousing and other means to further improve the utilization of warehousing resources, and reduce corporate warehousing costs. In addition, management costs and circulation and processing costs in the current total logistics costs accounted for 12% and 8% or so, through the promotion of logistics digital transformation and standardization, which is expected to continue to decline. The document also specifically mentions the criticality of optimizing the supply chain costs of bulk commodity logistics and the new energy industry. In the case of bulk commodities, for example, optimizing logistics paths, developing supply chain organization platforms, and promoting containerized transportation are expected to significantly reduce logistics expenditures for energy, minerals, and other products. For the new energy industry, especially the export logistics of electric vehicles, lithium batteries and photovoltaic products, the international competitiveness of the supply chain can be enhanced by optimizing transport solutions and upgrading the standardization of warehousing facilities.

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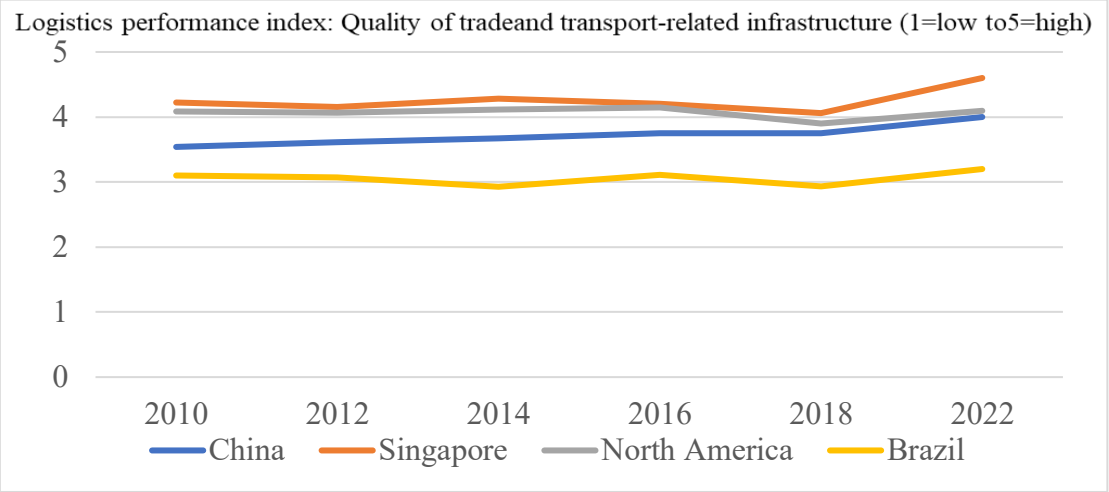

Figure 1: Logistics performance index: Quality of tradeand transport-related infrastructure (1=low to5=high). (Picture credit: Original).

According to data from the World Development Indicators database, China's Logistics Performance Index gradually rose from 3.54 in 2010 to 4 in 2022, Singapore improved from 4.22 to 4.6, North America's index remains basically stable with a small increase from 4.09 in 2010 to 4.1 in 2022, and Brazil's index declines from 3.1 in 2010 to 2018 to 2.93 before rebounding to 3.2 in 2022.

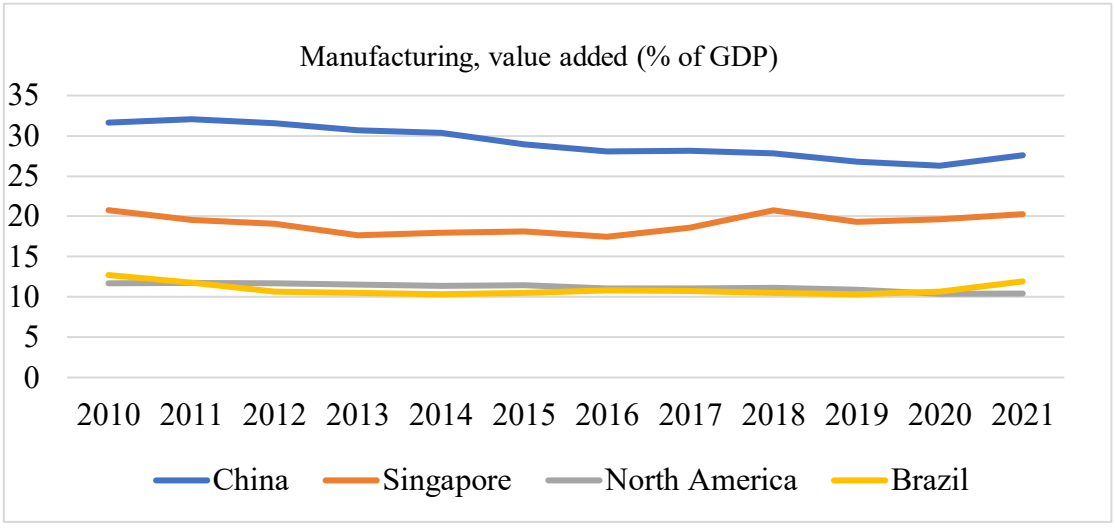

Figure 2: Manufacturing, value added (% of GDP). (Picture credit: Original).

According to data from the World Development Indicators database, China's manufacturing value-added as a percentage of GDP declined from 31.61% in 2010 to 27.07% in 2022, which is still at a high level despite the overall decline in the ratio, demonstrating the importance of the manufacturing sector in the economy. Singapore's manufacturing share declined from 20.77% in 2010 to 17.47% in 2018 before rebounding to 19.72% in 2022, indicating the resilience of its manufacturing sector and the stabilizing role of high value-added industries. North America: North America's manufacturing share gradually declined from 11.72% in 2010 to 10.39% in 2019, reflecting the continued contraction of the manufacturing share of GDP. Brazil: the manufacturing share in Brazil declined from 12.72% in 2010 to 10.53% in 2018, but then rebounded to 13.07% in 2022, showing some signs of recovery.

As seen from the above two sets of data and Figure 1, Figure 2, for developing countries with a high share of manufacturing, supply chain logistics costs remain an important constraint on economic

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efficiency. Despite the gradual improvement of logistics infrastructure, high logistics costs may still weaken the competitiveness of the manufacturing industry. Through optimization strategies, costs can be effectively reduced and supply chain efficiency improved [1, 2, 3].

3. Supply chain cost components and influencing factors

Supply chain logistics cost refers to all the costs incurred in the process of supply chain operation involving material transportation, warehousing, distribution, management and other links. It mainly includes transportation costs, inventory costs, warehousing costs and management costs. In order to achieve the optimization of logistics costs, scholars have proposed a variety of optimization goals and methods in different research contexts.

Transportation cost optimization: transportation cost is one of the main costs in supply chain logistics, and optimizing transportation cost is the core of much research. Transportation costs can be effectively reduced by adopting different transportation modes, choosing suitable transportation routes, and reducing the idling rate. Zhang studied the logistics cost control model based on path optimization and transportation mode selection, and proposed a strategy to reduce transportation costs through the shortest path algorithm and dynamic scheduling technology [4]. Comprehensive cost optimization: with the development of supply chain management theory, it is often difficult to solve the global problems in the supply chain by cost optimization in a single link. Therefore, more and more researchers have turned to the integrated optimization strategy, i.e., on the basis of comprehensively considering the costs of multiple links such as transportation, inventory, and warehousing, to seek an overall optimization scheme. They proposed a cost optimization model based on supply chain collaboration and resource sharing, emphasizing collaborative management across the entire supply chain to maximize overall benefits.

4. Recommendations and optimization strategies

4.1. Transportation cost optimization

In supply chain management, transportation cost occupies an important part of supply chain logistics cost, which is a key area to optimize logistics cost. Viswanath Cvsa pointed out that transportation costs can be effectively reduced and efficiency can be improved by choosing suitable transportation modes and reasonable transportation routes [5]. To this end, firstly, it is recommended to adopt a multi-modal transportation system, by combining multiple modes of transportation such as rail, road, and water transport, enterprises can choose the most suitable mode of transportation based on cost-effectiveness and timeliness, which does not only optimize costs but also enhances the flexibility and reliability of transportation.

Second, implementing dynamic route planning is also an important strategy for reducing transportation costs. Hua emphasizes the importance of real-time dynamic route optimization using GPS and GIS technologies [6]. These technologies enable firms to monitor transportation status in real time and dynamically adjust transportation routes based on external factors such as traffic flow and weather conditions in order to reduce unnecessary driving and lower fuel consumption.

Finally, strengthening cooperative relationships with suppliers and carriers can further optimize transportation costs. LaLonde mentions that supply chain cooperation not only helps to negotiate better prices for transportation contracts but also reduces idling and improves load factors by sharing transportation resources (e.g., by sharing means of transportation or consolidating cargo), which significantly reduces transportation costs and improves the overall efficiency of the supply chain. Overall supply chain efficiency [7].

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4.2. Inventory cost optimization

Inventory costs are another important cost area in the supply chain and are an important entry point for companies to improve supply chain efficiency. The strategic cost driver theory proposed by Michael Porter suggests that inventory-related direct and indirect costs can be effectively reduced by optimizing inventory management strategies [8].

First, the implementation of lean inventory management (e.g., just-in-time production (JIT)) can effectively reduce inventory levels and their associated costs. In his study, Wang emphasized that accurate demand forecasting and inventory control are the keys to achieving a close match between inventory and market demand, thus reducing the risk of excess inventory and stock-outs [9].

Secondly, optimizing warehouse layout and introducing automated equipment are important measures to improve warehousing efficiency. Zhao showed that by rationally laying out warehouse centers and applying intelligent equipment such as automatic picking systems, not only can labor costs be reduced, but also the error rate in warehousing operations can be significantly reduced, thus optimizing inventory management [10].

In addition, improving inventory transparency is a key factor in reducing inventory costs. With advanced inventory management systems (e.g., ERP and WMS), companies can track inventory status in real time, respond quickly to changes in market demand, and further reduce inventory backlogs and waste.

4.3. Integrated cost optimization

Comprehensive optimization of supply chain costs requires systematic management from a global perspective. First, adopting supply chain collaborative management is one of the core strategies for optimizing overall costs. Joseph Sarkis points out that duplication of work and waste in the supply chain can be reduced, resource sharing can be maximized, and total costs can be lowered through collaborative work among suppliers, manufacturers, distributors, and retailers [11].

Second, the introduction of integrated technological solutions (e.g., ERP systems, big data analytics, and cloud computing) is an important means of achieving cost optimization. Hua study shows that the application of modern information technology can integrate all aspects of the supply chain and provide more efficient decision support, thereby significantly improving the efficiency and accuracy of supply chain management [6].

Finally, continuous improvement and innovation are essential to sustain and enhance supply chain cost optimization. LaLonde and Pohlen mention that by regularly evaluating supply chain operations and uncovering potential cost-saving and efficiency-enhancing methods, firms can construct mechanisms for continuous improvement and encourage employees to participate in and contribute to innovative ideas in order to maintain long-term competitiveness.

5. Existing limitations and future prospects

Although supply chain logistics cost optimization strategies have achieved remarkable research and practice results in recent years, there are still some limitations to be overcome, as well as new directions for future research and practice. First, the unevenness of technology applications is a major problem. Advanced technologies such as big data and artificial intelligence are widely used in large enterprises and show good results, but small and medium-sized enterprises (SMEs) find it difficult to implement these technologies on a large scale due to resource constraints and high technological thresholds, thus limiting their optimization potential. In addition, the dynamic changes in market demand and the uncertainty of the supply chain have put forward higher requirements for cost optimization, and the traditional static optimization methods can no longer meet the demand for real-time adjustment. In a complex supply chain network, it remains a challenge to realize efficient

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collaborative management of each link. At the same time, data privacy and security issues pose obstacles to the widespread application of big data and AI technologies, especially in the sharing and protection of sensitive data, and the lack of trust mechanisms between enterprises. In the future, with the further development of information technology, research should focus more on real-time optimization strategies in dynamic environments, and explore how technological innovations can be better integrated with traditional supply chain management, especially the feasibility in SMEs. At the same time, the rise of green logistics has also raised new topics for supply chain logistics cost optimization, and future research can explore more deeply how to achieve environmental sustainability while reducing logistics costs. Through a comprehensive strategy combining technological innovation, collaborative management and green development, supply chain logistics cost optimization will develop in the direction of more intelligent, collaborative and sustainable development.

6. Conclusion

This paper provides an in-depth discussion of strategies for optimizing logistics costs in supply chains, incorporating both domestic and international research findings. The analysis focuses on the role of technological advancements in streamlining supply chain operations, where tools such as artificial intelligence, ERP systems, and big data analytics play a key role. These technologies enhance real-time decision making and operational agility, which is critical in the current fast-paced economic environment. In addition, the integration of sustainable practices and collaborative strategies in the supply chain has become a key trend aimed at reducing environmental impacts and increasing supply chain resilience.

From the gaps and ongoing challenges identified in this study, directions for future research can be discerned. A key area of research is the development of dynamic supply chain capabilities that enable them to adapt to market fluctuations and disruptions in real time. This will involve advanced predictive analytics and adaptive enhancements to logistics operations that ensure continuity and efficiency under multiple conditions.

In addition, there are notable challenges of unevenness in the application of technology, especially among small and medium-sized enterprises. Future research could focus on designing cost-effective technological solutions for SMEs to enable them to access advanced tools that promote competitive equality in the global marketplace.

In addition, the emerging paradigm of green logistics suggests new research avenues. Future research must explore how to integrate cost reduction strategies with environmental sustainability goals. This includes the development of innovative logistics practices that not only optimize costs but also reduce ecological footprints and contribute to more sustainable and responsible supply chain ecosystems.

In summary, while significant progress has been made in optimizing supply chain logistics costs, continued innovation and research is critical, particularly in the areas of technology and sustainability, in order to address emerging challenges and take advantage of new opportunities. The journey towards more efficient, flexible and greener supply chains continues, and future advances are expected to further revolutionize this critical area.

References

[1] *Chen, M. (2021). Research on cross-border e-commerce warehousing and logistics management.*

[2] *Zhang, D. (2024). Research on the integration optimization of sustainable supply chain networks in railway engineering construction. Journal of Rail Science and Engineering, 58(1), 100-110.*

[3] *Li, Y. T. (2022). Analysis of the impact of digital transformation on enterprise value chain cost management: A case study of Liangpinpuzi. [PDF].*

DOI: 10.54254/2754-1169/164/2025.20830

[4] Zhang, Y., Li, H., & Chen, X. (2022). Comprehensive cost optimization in supply chains: A systematic review. Journal of Supply Chain Management, 58(1), 23-44.

[5] Cvsa, V. (2014). Supply chain transportation modes: Cost efficiency and flexibility. Journal of Business Logistics, 35(1), 162-174.

[6] Hua, S. (2016). Dynamic routing optimization in supply chain transportation. International Journal of Logistics Management, 27(2), 355-373.

[7] LaLonde, B. J., & Pohlen, T. L. (1996). Issues in supply chain costing. International Journal of Logistics Management, 7(1), 1-12.

[8] Porter, M. (1980). Competitive advantage: Creating and sustaining superior performance. Free Press.

[9] Wang, D. S. (2009). Research on supply chain logistics cost management based on FAHP evaluation. Journal of Xi'an University of Engineering, 23(1), 120-126.

[10] Zhao, Z. C. (2022). The impact of multi-channel supply chain management on logistics cost control. (pp. 63-67).

[11] Sarkis, J. (2003). A strategic decision framework for green supply chain management. Journal of Cleaner Production, 11(4), 397-409.