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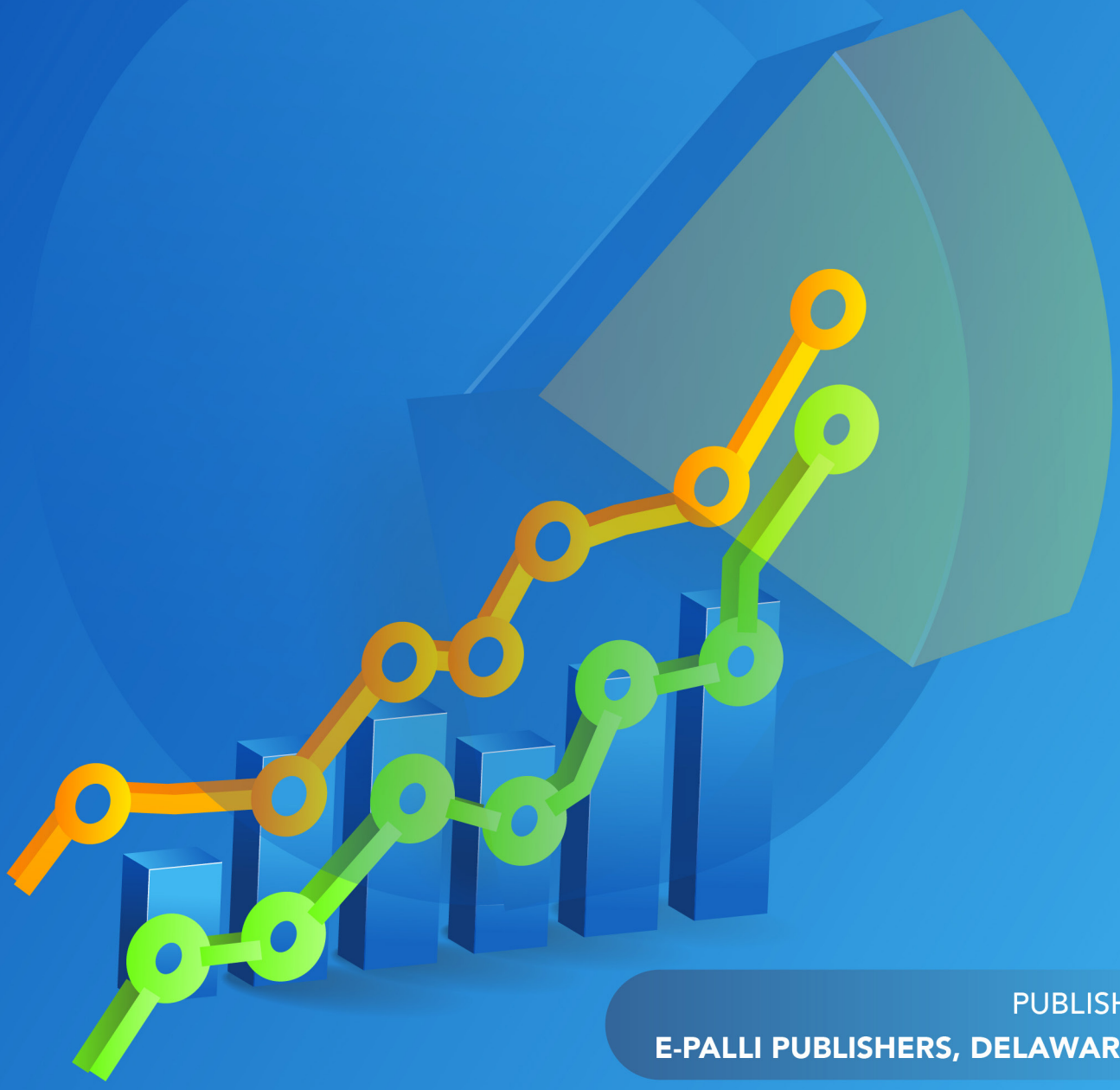

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# Innovative Logistics Solutions Formation of an Efficient Service System for Wholesale Businesses

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## ABSTRACT

In the context of globalization and rapid technological transformation, establishing an efficient logistics service system is critical for wholesale enterprises. This study investigates how logistics outsourcing, service innovation, and 3D printing technology synergistically drive innovative logistics solutions. Through an integrated approach combining literature review and case studies, the study reveals three key findings: First, logistics outsourcing reduces operational costs and enhances competitiveness by leveraging specialized third-party expertise. Second, service innovation strengthens service quality and market positioning through data-driven analytics and customer-centric customization strategies. Third, 3D printing technology diminishes global logistics volumes via localized on-demand production while addressing personalized consumer demands. The integration of these three elements fosters a flexible and sustainable logistics ecosystem, enabling enterprises to balance efficiency and environmental objectives. However, challenges such as technology implementation costs, workforce adaptability, and supply chain collaboration require systematic mitigation strategies. The study concludes by emphasizing that the strategic alignment of technological innovation and operational synergies is pivotal for wholesale enterprises to develop future-ready logistics systems. It further proposes a practical framework for achieving sustainable growth, while suggesting future research directions to explore advanced applications of artificial intelligence and blockchain technologies in this domain.

## INTRODUCTION

In the contemporary business landscape, the formation of a robust logistics service system is essential for the success of wholesale enterprises (Guterres, 2020). As the backbone of supply chain management, logistics plays a critical role in ensuring the smooth and efficient flow of goods from producers to consumers (Woźniak, 2021). Wholesale enterprises, in particular, deal with large volumes of products that need to be moved quickly and accurately to meet customer demands (Soja & Soja, 2020). The complexity of logistics operations has increased significantly due to the rapid pace of technological advancements and market globalization, making it imperative for businesses to develop innovative logistics systems.

An effective logistics service system encompasses various components such as inventory management, order processing, transportation management, and warehousing (Carrelli *et al.*, 2000). These components must work seamlessly together to enhance operational efficiency, reduce costs, and improve service levels (Yeh, 2017). The goal is to create a logistics framework that not only meets the current needs of the business but also has the flexibility to adapt to future changes and challenges (Xiong & Qureshi, 2013).

The integration of advanced technologies is a key factor in the modernization of logistics services (Venkatesh *et al.*, 2003). Technologies such as real-time tracking, automated inventory management, and data analytics have revolutionized the way logistics operations are conducted (Abed, 2020). These technologies facilitate better decision-making processes, increase transparency, and provide valuable insights that can be used to optimize logistics performance.

Moreover, the implementation of sustainable logistics practices has become increasingly important in today's environmentally conscious society. Businesses are now focusing on reducing their carbon footprint and adopting eco-friendly practices in their logistics operations (Jin & Choi, 2019). This includes the use of electric vehicles, optimizing delivery routes to minimize fuel consumption, and implementing green packaging solutions.

Despite the potential benefits, the formation of an effective logistics service system is not without its challenges (Al Omoush *et al.*, 2018). Businesses must navigate various obstacles such as high implementation costs, resistance to change from employees, and the need for continuous training and development. Additionally, external factors such as regulatory requirements and market fluctuations can impact the effectiveness of logistics operations (Prasanna *et al.*, 2019).

This paper aims to explore the formation of an effective logistics service system for a wholesale enterprise, delving into its critical components, implementation strategies, challenges, and future trends. By synthesizing insights from established research and real-world case studies, this study seeks to provide a comprehensive framework that wholesale businesses can adopt to enhance their logistics operations and achieve sustainable competitive advantage. The focus will be on identifying best practices

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and innovative solutions that can be tailored to the specific needs of wholesale enterprises.

## LITERATURE REVIEW

The formation of an effective logistics service system for wholesale enterprises is a multifaceted challenge that requires a comprehensive understanding of logistics innovation, information technology integration, and sustainable practices. The significance of logistics in modern business operations is well-documented in the academic literature, highlighting its role in enhancing operational efficiency, reducing costs, and improving service levels.

Previous research discussed the critical importance of innovation in logistics services, emphasizing that businesses must continually evolve their logistics models to remain competitive (Chapman *et al.*, 2003). They argue that integrating innovative approaches can lead to the development of new business models that are more adaptive to economic and technological changes. This perspective is particularly relevant for wholesale enterprises, which must handle large volumes of goods and require efficient logistics systems to ensure timely delivery and customer satisfaction.

Grets and Kasarda (1997) further explore the impact of the information era on enterprise logistics, noting that the integration of advanced information technologies has revolutionized logistics operations. They highlight that real-time tracking, automated inventory management, and data analytics have become essential tools for modern logistics systems. These technologies facilitate better decision-making processes, increase transparency, and provide valuable insights for optimizing logistics performance. The authors underline the necessity for businesses to embrace these technological advancements to enhance their logistics capabilities and maintain a competitive edge (Grets & Kasarda, 1997).

In the context of food supply chains, Van der Vorst, Beulens, and van Beek provide valuable insights into the role of innovations in logistics and ICT. They argue that leveraging these innovations can significantly enhance the traceability, transparency, and efficiency of food supply chains. This is particularly important for ensuring food safety and quality, which are critical concerns for both consumers and regulators. The authors provide examples of how ICT solutions can be implemented in food supply chains to improve logistics performance and meet stringent regulatory requirements (Van der Vorst *et al.*, 2005).

Pfohl offers a comprehensive overview of logistics systems, emphasizing the complexity of managing the various components of logistics operations. He discusses the importance of a well-structured logistics framework that can handle the intricate interrelations within supply chains. Pfohl argues that an efficient logistics system is vital for reducing costs, improving service levels, and ensuring the seamless movement of goods from suppliers to end consumers. He also highlights the role of sustainable logistics practices in reducing the environmental impact of logistics operations, an increasingly important consideration in today's business environment (Pfohl, 2010).

The literature also identifies several challenges in the formation and implementation of logistics service systems. High implementation costs, resistance to change from employees, and the need for continuous training and development are common obstacles that businesses face. Additionally, external factors such as regulatory requirements and market fluctuations can impact the effectiveness of logistics operations. Addressing these challenges requires a strategic approach that includes careful planning, integration of advanced technologies, and a focus on continuous improvement.

### The Management Logic of Logistics Outsourcing

According to Coase's theory of corporate organization, the market and the enterprise are two coordination mechanisms for resource allocation. The market realizes resource allocation through the price system, while the enterprise realizes resource reconfiguration through organizational power. These two methods can replace each other, so "make-or-buy" has become an important choice for enterprises to pursue cost-effectiveness maximization in market competition. In the market competition environment, enterprises improve their market competitiveness by optimizing resource allocation methods. Logistics outsourcing has become an important choice because it can help enterprises improve the quality of logistics services while reducing costs.

The total logistics cost of an enterprise includes transportation costs, warehousing and inventory holding costs, and related management expenses. In order to minimize the total logistics cost while meeting customer needs, enterprises often weigh the cost of making and purchasing. Logistics outsourcing has become an important strategy for manufacturing enterprises. Through outsourcing, enterprises can use the resources and technology of professional logistics companies to achieve more efficient logistics management and respond to market changes more flexibly.

The management logic of logistics outsourcing emphasizes that enterprises must establish an effective collaboration mechanism. This mechanism requires manufacturing enterprises and logistics enterprises to reach a consensus on service concepts and values, and jointly respond to market changes and customer needs. In this collaborative relationship, manufacturing enterprises are usually in an active position, while logistics enterprises need to continuously innovate service models to meet the needs of manufacturing enterprises. When outsourcing logistics management, enterprises also need to consider the risk management of outsourcing decisions. Although outsourcing can bring cost savings and efficiency improvements, it is also accompanied by certain risks, such as substandard service quality and delivery delays. Therefore, when choosing logistics outsourcing, manufacturing enterprises need to establish a strict

supervision and evaluation mechanism to ensure the reliability of outsourced service quality. In addition, the decision to outsource logistics needs to comprehensively consider many factors, including cost, service level, technical capabilities and market changes. When choosing a logistics outsourcing partner, manufacturing enterprises should comprehensively evaluate the service capabilities, technical level and market reputation of logistics companies to ensure that the selected partners can provide high-quality logistics services.

Through this multi-dimensional evaluation and management, manufacturing enterprises can form a flexible and efficient logistics service system, effectively optimize resource allocation, and enhance market competitiveness. It is worth mentioning that the global logistics market is expanding rapidly. According to market research reports, the global logistics market size reached approximately $8.6 trillion in 2023 and is expected to continue to grow at an average annual rate of more than 5% in the next few years. This growth reflects the strong demand for efficient logistics services in the global economy.

Figure 1 shows a keyword network related to "supplier selection". Through the connection between each key term, it intuitively shows the relationship and importance of various concepts in the field of supplier selection.

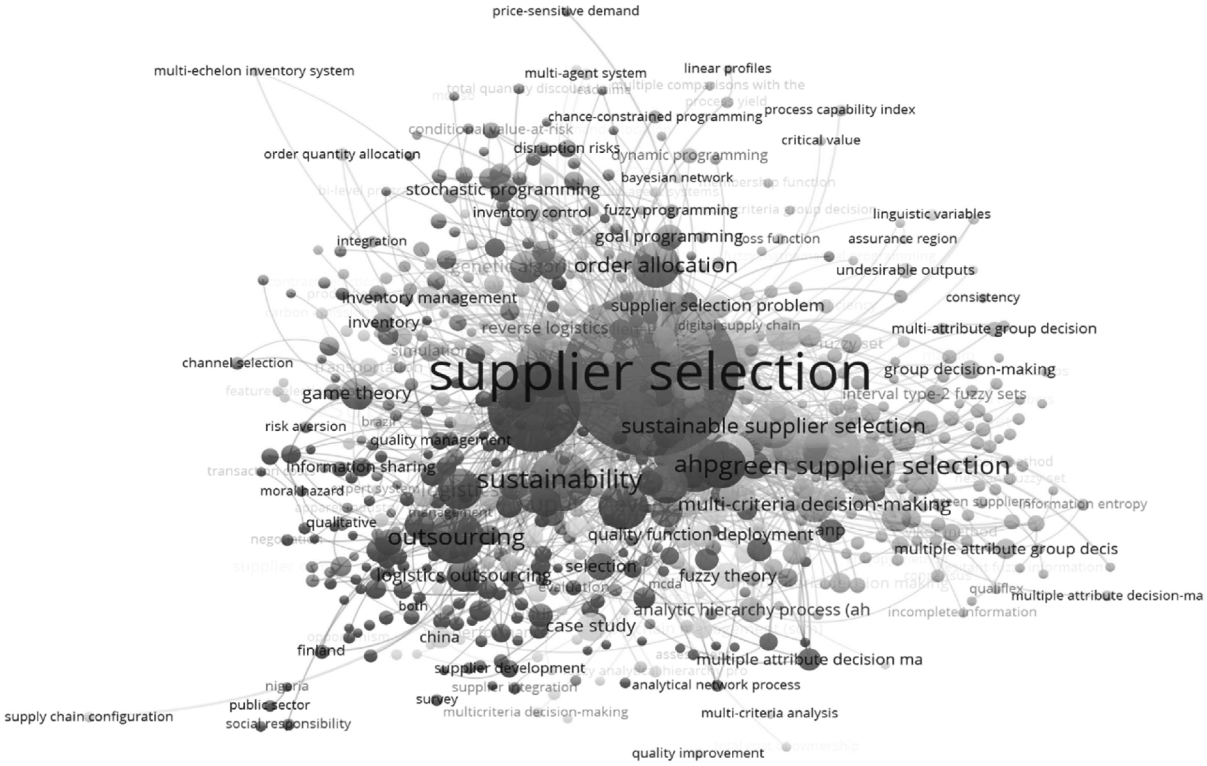


**Figure 1:** Network analysis of co-occurrence according to authors' keywords with 17 clusters

The key terms in the figure include "supplier selection", "sustainability", "outsourcing", "inventory management", "stochastic programming", "order allocation", "game theory", "multi-criteria decision making (MCDM)", "analytic hierarchy process (AHP)" and "fuzzy programming". These terms reflect the complexity of various decision factors and methods in the supplier selection process. This chart is closely related to the management logic of logistics outsourcing. Supplier selection is one of the key factors for the success of logistics outsourcing, which directly affects the quality and cost of logistics services. As described in this article, when making logistics outsourcing decisions, enterprises need to comprehensively consider multiple factors such as cost, service level, technical capabilities and market changes to ensure the reliability and efficiency of outsourced services. Through this visual approach, we can better understand and analyze the various factors and methods involved in the supplier selection process, thereby optimizing logistics outsourcing strategies and improving the market competitiveness of enterprises. The keyword network shown in Figure 1, helps to identify key decision points and optimization opportunities in the supplier selection process, and provides an effective framework to help enterprises make wise outsourcing decisions in a complex market environment.

**Service Innovation of Logistics Enterprises**

In order to achieve effective collaboration between the manufacturing industry and the logistics industry, logistics enterprises need to continuously innovate service concepts and models. First of all, logistics enterprises must realize that the ultimate goal of logistics outsourcing of manufacturing enterprises is to improve market competitiveness. This requires logistics enterprises to increase the value-added content of management services in the service process and show customers that the risks of logistics management outsourcing are controllable.

The role of logistics enterprises should change from a simple "hourly worker" to a more advanced "steward" role. This means that logistics enterprises must not only complete specific logistics tasks, but also deeply participate in the logistics management process of customers and become management consultants and executors of manufacturing enterprises. Through this role change, logistics enterprises can provide higher value-added services and enhance cooperative relations with customers.

**In Terms of Specific Service Innovation, Logistics Enterprises Can Start from the Following Aspects**

First, logistics enterprises need to update their service concepts. At any time, logistics enterprises should not forget that the purpose of logistics outsourcing of manufacturing enterprises is to improve the market competitiveness of enterprises, and the two decisive factors in outsourcing decisions are cost and service. Logistics is a management activity. In the process of providing logistics services to customers, efforts must be made to increase the value-added content of management services and show customers that the risks of logistics management outsourcing are controllable. At the same time, logistics management issues must be rethought in the context of customer supply chain management.

Secondly, logistics companies need to innovate cooperation models. Logistics companies should quickly complete the role transformation from "hourly workers" to "nannies" and then to "stewards", strive to integrate into the logistics management process of customers, sincerely turn themselves into the (non-staff) logistics management department of manufacturing companies, and at least position themselves as the loyal executors and logistics management consultants of the logistics management plans of manufacturing companies.

In addition, innovation in customer resource development is the key to service innovation of logistics companies. Customers are the most important strategic resources for the survival and development of logistics companies. Logistics companies must conduct in-depth research on customers' production organization methods, supply chain operation status and value chain distribution, timely discover the "blue ocean" of logistics value-added services, and provide differentiated logistics service support for manufacturing companies. In the context of economic globalization, logistics companies must learn to integrate the "intelligence" of various professional institutions and use their research results to improve their service capabilities.

Logistics companies also need to increase the transparency of logistics services. Improving transparency will increase trust, trust will enhance collaboration, and collaboration will discover more extended services and linkage opportunities. As the financial crisis continues to spread, "huddling together for warmth" with their customers should be one of the preferred options for logistics companies to "survive the winter".

Finally, innovation in logistics cost management is also an important aspect of service innovation for logistics companies. The contribution of logistics companies to customer logistics cost management lies not only in reducing service prices, but also in the service value-added of the logistics management solutions provided. Logistics companies should strive to improve the value of logistics outsourcing or logistics services and enhance the market competitiveness of customers by understanding customer service requirements, optimizing service solutions, simplifying service processes, and improving information sharing levels.

**Table 1:** Total volume of the global logistics services market from 2001-2024

| Year | Total volume of the global logistics services market in (USD 100 million) |
|---|---|
| 2001 | 3200 |
| 2002 | 3300 |
| 2003 | 3400 |
| 2004 | 3600 |
| 2005 | 3800 |
| 2006 | 4000 |
| 2007 | 4300 |
| 2008 | 4600 |
| 2009 | 4700 |
| 2010 | 4900 |
| 2011 | 5200 |
| 2012 | 5400 |
| 2013 | 5700 |
| 2014 | 6000 |
| 2015 | 6300 |
| 2016 | 6600 |

| | |
|---|---|
| 2017 | 7000 |
| 2018 | 7300 |
| 2019 | 7600 |
| 2020 | 8000 |
| 2021 | 8300 |
| 2022 | 8700 |
| 2023 | 9100 |
| 2024 | 9500 |

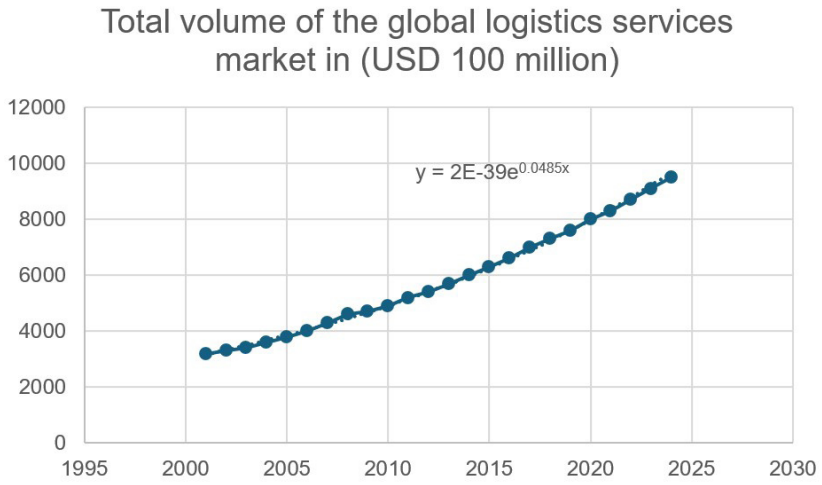


**Figure 2:** Linear regression analysis of logistics market volume

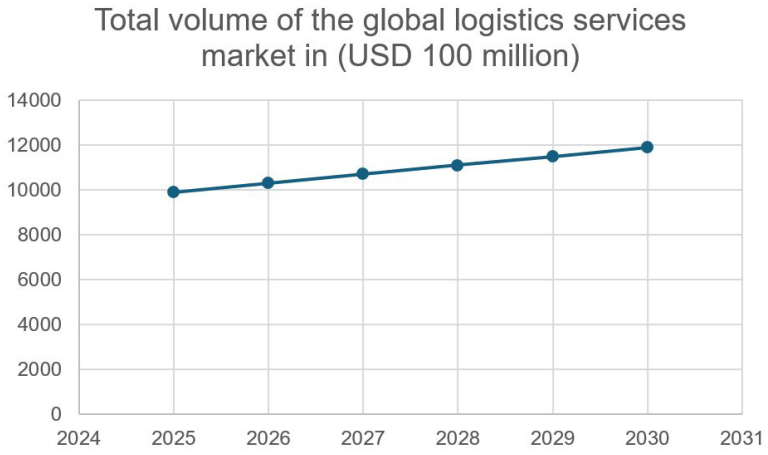


**Figure 3:** Logistics Market Volume Forecast

Through service innovation, logistics companies can better meet the needs of manufacturing companies, enhance their own market competitiveness, and achieve collaborative linkage with manufacturing companies. It is worth noting that the global logistics service market is growing rapidly. According to Table.1, the linear regression model is used to predict the total volume of the global logistics service market from 2025 to 2030 based on the existing data, as shown in Figure 2 and 3, and the previous data trends are continued for prediction, the global logistics service market is expected to reach nearly US$10 trillion by 2026, code is shown in appendix 1. This growth trend shows the increasing demand for efficient and innovative logistics services.

**The Impact of 3d Printing on the Logistics Industry**

As an important innovative means of logistics, the rapid development of 3D printing technology has had a profound impact on the logistics industry. First, 3D printing technology brings production bases closer to consumer destinations, which will lead to a reduction in global logistics volume. As more products are produced near consumer locations, the global logistics network will face a strategic contraction, and logistics companies need to adjust their business models to adapt to new market demands. The continuous enrichment of 3D printing materials has enabled 3D printing technology to be applied in more fields.

At present, 3D printing has been applied to manufacturing, service, education, scientific research and other fields, including automobiles, clothing, medical care, food, aerospace, teaching, etc. This diversification of materials and application fields has shifted logistics demand from traditional raw materials and finished product transportation to the transportation of 3D printing materials and related technical support. A notable feature of 3D printing technology is that its product design space is unlimited and can meet personalized needs. In today's market-oriented world, consumers' personalized needs are increasing, and 3D printing technology can just meet this need. Enterprises can design and produce personalized products according to the specific needs of customers, and logistics companies need to provide flexible logistics solutions to support this personalized production method. In addition, 3D printing technology enables manufacturing companies to adjust production processes more flexibly, which requires logistics companies to have stronger adaptability and innovation capabilities to meet the changing needs of manufacturing companies.

Logistics companies need to continue to work hard on service innovation, provide more flexible and efficient logistics services, and achieve collaborative linkage with manufacturing companies. 3D printing technology has put forward higher requirements for logistics companies. Logistics companies need to continuously improve their own technical level and service capabilities to cope with the challenges and opportunities brought by 3D printing technology. For example, logistics companies can improve the automation level and service quality of logistics management, reduce logistics costs, and improve logistics efficiency by using advanced information technology. At the same time, logistics companies need to strengthen cooperation with 3D printing technology providers to jointly develop new logistics solutions. Through cooperation, logistics companies can better understand the development trend and market demand of 3D printing technology, and timely adjust their own business models and service strategies to adapt to market changes.

In summary, the rapid development of 3D printing technology has had a profound impact on the logistics industry. Logistics companies need to continuously innovate service models, improve service quality and transparency to adapt to the changing needs of manufacturing companies, so as to maintain competitiveness in the fierce market competition. At the same time, logistics companies also need to strengthen cooperation with 3D printing technology providers, jointly develop new logistics solutions, and achieve collaborative linkage with manufacturing companies. Through this collaboration and innovation, logistics companies can better cope with the challenges brought by 3D printing technology, seize new market opportunities, and build an efficient wholesale business service system. According to market data, the global 3D printing market is expected to reach US$34 billion in 2025, which further shows the important position and huge potential of 3D printing technology in the future market.

## CONCLUSION

In today's rapidly changing business environment, building an efficient logistics service system is crucial to the success of wholesale enterprises. This article analyzes the management logic of logistics outsourcing, the service innovation of logistics enterprises, and the impact of 3D printing technology on the logistics industry. Together, these factors constitute the core elements of innovative logistics solutions.

First, as an important way of resource allocation, logistics outsourcing can help wholesale enterprises reduce costs, improve service quality, and enhance market competitiveness. When choosing logistics outsourcing, enterprises need to establish an effective collaboration mechanism and comprehensively consider factors such as cost, service level, technical capabilities and market changes to ensure the reliability and efficiency of outsourced services.

Secondly, logistics enterprises can better meet the needs of wholesale enterprises through continuous service innovation. Service innovation includes updating service concepts, innovating cooperation models, developing customer resources, increasing service transparency and optimizing cost management. These innovative measures not only help to improve the quality of logistics services, but also enhance the competitiveness of logistics enterprises in the market and achieve collaborative linkage with manufacturing enterprises. Finally, the rapid development of 3D printing technology has had a profound impact on the logistics industry. 3D printing technology makes production bases closer to consumer destinations, thereby reducing global logistics volume and prompting logistics companies to adjust their business models. In addition, 3D printing technology meets the personalized needs of consumers and requires logistics companies to provide more flexible and efficient logistics solutions. Overall, the management logic of logistics outsourcing, the service innovation of logistics companies, and the application of 3D printing technology constitute the key elements of innovative logistics solutions. These elements interact with each other and jointly promote the construction of an efficient wholesale business service system. Through continuous optimization and innovation, wholesale companies can maintain their leading position in the fierce market competition and achieve sustainable development.

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