

An Analysis of the Development Status and Response Strategies for China's Overseas Warehouses in the Context of Cross-Border E-commerce

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Abstract: In the context of the deep evolution of global digital trade, cross-border e-commerce has become a key force in reshaping the international trade landscape. Overseas warehouses, as a new type of infrastructure supporting its development, have effectively overcome the time and space barriers of cross-border logistics through localized warehousing and distribution. This paper systematically reviews the development history and main models of China's overseas warehouses and presents their considerable scale and continuous expansion based on detailed data. The research focuses on revealing the core dilemmas currently facing the development of China's overseas warehouses, including high operating costs, difficulties in coordinating multiple warehouses across different countries, inefficient inventory management, obstacles to localization, and a scarcity of versatile talent. In response to these issues, this paper proposes targeted and systematic countermeasures. The research indicates that only through the coordinated promotion of business model innovation, adaptation of institutional rules, and empowerment through digital technology can overseas warehouses transform from cost centers into profit engines. This will ultimately support a resilient global logistics foundation for "Made in China" products going abroad and provide key support for building the "dual circulation" new development pattern.

Keywords: Cross-border e-commerce, overseas warehouse, development dilemmas

1. Introduction

In the profound evolution of the global digital trade wave, cross-border e-commerce has become a pivotal force reshaping the international trade structure, with digital trade representing its new direction for growth. As an infrastructural revolution supporting this new business format, the overseas warehouse model effectively breaks the spatio-temporal barriers of cross-border logistics through localized warehousing and distribution networks, reshaping the supply chain paradigm for "Made in China" products going global. In recent years, China's cross-border e-commerce has shown explosive growth. According to the General Administration of Customs China, between 2014 and 2024, the transaction scale of China's cross-border e-commerce jumped from 3.1 trillion yuan to 17.5 trillion yuan, with an average annual growth rate exceeding 15%. Its proportion of total foreign trade value increased from 8.2% to 18.7%. This strong growth stems from both the continuous release of policy dividends — with the state incorporating overseas warehouses into the "new foreign trade formats" strategy for focused cultivation — and the deep empowerment of the supply chain by technologies like big data and artificial intelligence.

However, beneath the surface of expanding market scale, the long delivery times of traditional postal packets, often exceeding ten days, coupled with high costs for returns and exchanges, and the pain points of international express models — such as long delivery cycles, high costs, and difficult returns — have severely restricted the industry's deep development. Against this backdrop, overseas warehouses have emerged as a new type of infrastructure to break through logistics bottlenecks. By establishing warehousing nodes in destination countries, they build supply chain hubs that integrate warehouse management, intelligent sorting, and local distribution. This enables localized shipping, returns, and flexible supply chain management, reducing cross-border logistics times to 3-5 days and significantly cutting costs, thereby becoming a key vehicle for supporting the industry's high-quality development.

The global operation of overseas warehouses is facing multiple structural challenges. Current research urgently needs to systematically address three core propositions: first, how to optimize the global network layout of overseas warehouses amidst multiple trade barriers and technological divides; second, how to build a resilient operational system in the face of structural challenges such as localized operations, multi-country multi-warehouse coordination, and a scarcity of versatile talent; third, how to achieve deep synergy between cross-border logistics and commercial flows under the wave of 4PL and intelligentization. By integrating practical wisdom and theoretical innovation from government, industry, and academia, this paper aims to explore the advanced path for China's overseas warehouses, providing decision-making support for building a "dual circulation" logistics new ecosystem.

Therefore, this paper aims to resolve the aforementioned contradictions. By systematically reviewing the development trajectory and current characteristics of China's overseas warehouses and deeply deconstructing the practical difficulties in their operational costs, management efficiency, inventory optimization, and local integration, it proposes actionable upgrade paths. The research aims to provide a theoretical reference for building a more resilient, efficient, and globally competitive cross-border supply chain system, helping Chinese enterprises seize the strategic initiative in the new round of international economic and trade rule restructuring.

2. Research Overview

2.1 Concept Description

An overseas warehouse is a comprehensive service system provided by professional online foreign trade platforms and experienced logistics service providers. This system is not a simple superposition of services but a one-stop management service that covers commodity storage, fine sorting, rigorous packaging, and efficient distribution, always with "sales" as the core objective.

For cross-border e-commerce sellers, overseas warehouses allow them to store goods in warehouses at the sales destination in advance. Once a buyer places an order, the shipping process can be initiated locally, achieving immediate, on-site dispatch. This not only significantly shortens the long cross-border shipping time but also provides buyers with a fast experience similar to local shopping [1].

However, the development of overseas warehouses has two sides. Their significant advantages lie in effectively reducing logistics costs, increasing dispatch speed, shortening delivery cycles, and simplifying the return and exchange process [2]. But at the same time, overseas warehouses have limitations: not all products are suitable, and non-best-selling items can easily lead to the risk of overstocking. Furthermore, their high warehousing costs, equipment maintenance and personnel management fees, and the management complexity brought by differences in laws, regulations, and cultural policies in different regions all constitute significant uncertainties[3]. Therefore, systematic research on overseas warehouses is of great significance.

2.2 Development History

Overseas warehouses, as the "new infrastructure" of cross-border e-commerce, did not develop overnight. Their growth has been shaped by multiple factors, including policy and historical context. This journey of development is not just an iteration of a logistics model, but also a vivid reflection of the changing landscape of global trade.

Nascent Stage (1990s - 2008): Initially, these were "forwarding warehouses" established by traditional foreign trade companies to improve efficiency. With the rise of early C2C e-commerce, sellers began to spontaneously use overseas relatives, friends, or small-scale warehouses for local fulfillment. This formed the prototype of overseas warehouses serving cross-border e-commerce, initially validating their value in shortening logistics times and enhancing competitiveness.

Exploratory Growth Stage (2008 - 2015): Influenced by the 2008 financial crisis, cross-border e-commerce developed rapidly, providing fertile ground for the growth of overseas warehouses. In 2015, the cross-border e-commerce industry and its logistics methods showed a trend of transitioning from the traditional direct mail model to the overseas warehouse model, which is widely regarded by the industry as the "beginning of the era of overseas warehouses" [4]. The launch of Amazon's FBA (Fulfillment by Amazon) service in 2007 was a milestone event. It not only provided a standardized, one-stop solution but also popularized the concept of overseas warehouses throughout the industry. Inspired by this, a number of third-party overseas warehouse service providers emerged.

Expansion and Dividend Stage (2016 - 2019): Driven by both the surge in demand for cross-border e-commerce and supportive national policies (the term "overseas warehouse" was first included in the Government Work Report in 2016), overseas warehouses entered a "golden era of development." Their numbers and total area expanded rapidly. The geographic layout extended from Europe and the United States to emerging markets, creating a landscape where third-party warehouses, platform-owned warehouses (like FBA), and seller-operated warehouses coexisted.

Intelligent Upgrade and Diversified Development Stage (2020 - Present): The COVID-19 pandemic acted as a catalyst for development. The direct shipping model's disadvantages were highlighted by unstable logistics capacity, which infinitely magnified the advantages of the overseas warehouse model that relies on pre-stocking inventory. It has since become a "standard configuration" and a "lifeline" for sellers, accelerating the industry's upgrade towards intelligent and diversified development.

3. Development Models

3.1 Seller-built Model

This model is where large-scale e-commerce enterprises with strong financial backing. For example, Amazon, eBay, and DHgate are typical representatives of the seller-built model, they invest in and operate their own overseas warehouses [5]. The primary goal is to address cross-border logistics challenges and establish a brand image abroad. This model requires a huge investment, making it suitable for leading enterprises with ample capital and management experience. Its advantages include controllable long-term costs and high management flexibility.

3.2 Cooperation with Third Parties Model

This refers to e-commerce companies using overseas warehouses established by major cross-border e-commerce platforms. Sellers store their goods in the platform's warehouse, and the platform then uses its mature information systems and logistics network to handle order reception, outbound processing, and delivery.

3.3 One-stop Service Model

In this model, e-commerce companies partner with professional third-party logistics firms, like WINIT. The logistics company leverages its expertise to provide a complete, end-to-end logistics solution, including product transportation, overseas warehouse management, secondary packaging, and final delivery.

4. Development Scale

The rapid development of overseas warehouses is inseparable from strong national policy support. The Opinions on Cross-Cycle Adjustment to Further Stabilize Foreign Trade, issued by the General Office of the State Council, explicitly encourages the development of new foreign trade formats and elevates the construction and use of overseas warehouses to a position of importance, highlighting their key role in stabilizing foreign trade. This policy also encourages financial institutions to provide funding support for overseas warehouses in a market-oriented way, creating more possibilities for enterprises to build and use them.

The emergence and growth of overseas warehouses are closely linked to the trajectory of the cross-border e-commerce industry. As cross-border e-commerce business continues to expand, it has placed higher demands on the logistics and distribution links, giving rise to the overseas warehouse model. The increasing diversification of China's foreign trade, which is no longer limited to traditional European and American markets but also includes frequent cross-border e-commerce trade with regions like Asia, South America, and Africa, has further boosted the demand for overseas warehouses.

According to data from the Ministry of Commerce, as of June 2024, there were over 120,000 cross-border e-commerce entities in China and more than 1,000 cross-border e-commerce industrial parks. At the same time, China has built over 2,500 overseas warehouses with a total area exceeding 30 million square meters. Of these, more than 1,800 warehouses, covering over 22 million square meters, are specifically dedicated to serving cross-border e-commerce, indicating a considerable and continuously growing trend.

5. Dilemmas in China's Overseas Warehouse Development

5.1 High Operating Costs

Overseas warehouses are capital- and technology-intensive infrastructures, primarily located in developed countries like the US and Europe. In the initial stage, they bear a series of high expenses, including site selection and planning, facility construction, equipment procurement, information processing system development, logistics and transportation, cargo storage and information management, and personnel allocation [6]. For example, warehouse workers in the US and Europe earn over four times the hourly wage of their domestic counterparts, leading to an annual labor expenditure of over \$360,000 per warehouse. Additionally, the startup cost for a single 1,000-square-meter warehouse exceeds \$500,000. These high costs mean that most small and medium-sized enterprises (SMEs), with the exception of a few giants, find themselves in a position where "setting up a warehouse equals losing money."

5.2 Difficulty in Managing Multiple Warehouses Across Countries

Managing multiple warehouses across different time zones leads to poor communication and information silos. For instance, the 13-hour time difference between China and the US means that inventory transfer instructions can take up to 48 hours to be processed, impacting the timeliness of decisions. Furthermore, differences in labor laws and cultural practices—such as foreign employees' reluctance to work overtime—add to the complexity of collaborative management.

5.3 Low Inventory Management Efficiency

E-commerce businesses stock up in advance to prepare for market demand. However, some sellers lack experience and make incorrect market predictions, leading to inventory buildup and product stagnation. With the cross-border logistics information traceability rate below 40%, and complaints about false shipments far exceeding the industry average [7]. This not only wastes warehousing resources but also puts a strain on the company's cash flow.

5.4 Difficulty with Localization and Integration

The difficulty in localized operational management lies in the significant differences in purchasing habits and product preferences across countries due to economic and cultural variations [8]. For example, in China, where the power supply is stable, there is a wide variety of lighting products. In contrast, in areas with unstable power, the market prefers solar or rechargeable lighting. Additionally, disparities in information management and logistics technology levels between different countries create information asymmetry, which negatively affects the consumer experience.

5.5 Scarcity of Overseas Warehouse Talent

Overseas warehouse operations are highly dependent on information technology and versatile professionals. However, the industry is in its early stages of development, and there is a severe shortage of compound talents skilled in supply chain management, IT, e-commerce operations, and logistics management[9]. This talent gap is particularly significant in leading enterprises, where it can be as high as 70-80%.

5.6 Lagging Adaptation of Systems and Technology

Overseas warehouses face compliance risks and technological gaps. For example, "gray customs clearance" and sudden policy changes (such as the US Postal Service canceling its international small packet scanning service) increase operational uncertainty. The high cost of reverse logistics also makes return and exchange mechanisms a major pain point in the industry. The provided text ends abruptly, but it seems to be heading towards discussing challenges related to payment systems.

6. Countermeasures

In the context of increasingly close global trade and the booming development of cross-border e-commerce, building an efficient, low-cost, and highly resilient overseas logistics system has become key for enterprises to succeed. This chapter aims to deeply analyze the core challenges currently faced by overseas warehouse operations and systematically propose a series of innovative solutions from five dimensions: network architecture, digital transformation, supply chain optimization, localization strategy, and talent development. We will explore how to comprehensively improve the operational efficiency of cross-border logistics, reduce overall costs, and effectively respond to the uncertainties in the globalization process through a lightweight network, a global digital foundation, an elastic supply chain, a localized ecological network, and a resilient development framework, thereby building a sustainable competitive advantage for enterprises.

6.1 Lightweight Network Architecture and Centralized Resource Coordination

To address the dilemma of high operating costs, it is necessary to reconstruct the network topology of overseas warehouses. Based on the principles of economies of scale and scope, a hierarchical layout strategy of "core hub warehouses + distributed satellite warehouses" should be implemented. Highly automated core hubs should be built in logistics hub cities to handle cross-border trunk line collection, distribution, and intelligent sorting. Satellite warehouses should be located in low-labor-cost areas to specialize in last-mile delivery and return processing. Through dynamic scheduling algorithms for logistics resources, the utilization rate of warehousing facilities can be increased by more than 40%. Simultaneously, the "shared warehouse" model should be promoted. Industry associations can take the lead in establishing a joint warehousing platform for cross-border enterprises. Through time-sharing leases of warehouse space and shared equipment mechanisms, the fixed costs for small and medium-sized enterprises can be converted into variable costs.

In other words, in the transit stage, by integrating and building multi-functional sites, capacity utilization can be continuously improved, thereby reducing time and space waste between different operations and increasing overall efficiency. In the transportation stage, transshipment models and route planning should be optimized. By reducing transshipment nodes, shortening transport times, and lowering transport costs, centralized shipping and direct routes can be maximized, thus improving transport efficiency and reliability. In the final stage, the model transformation should be continuously deepened. By improving the efficiency of network outlets, including optimizing delivery routes and increasing delivery speed and accuracy, the operating cost per parcel will be driven down, making the logistics system both highly efficient and low-cost. At the same time, continuous deepening of the operational model reform, strengthening of network integration, and lean management of resources are necessary. By introducing advanced management concepts and technical means, various

resources can be integrated and optimized to achieve efficient allocation and utilization, reduce waste and redundancy, and improve operational efficiency.

6.2 Building a Global Digital Foundation and Cross-Time-Zone Decision-Making Mechanism

Given that the cross-border e-commerce logistics process is complex and lengthy, logistics companies often face issues like delayed visibility tracking and untimely information feedback, which seriously affect logistics efficiency and increase operational costs.

SF Express's practice provides a model solution: SF is committed to promoting operational digitalization and intelligent decision-making in all business segments. Its City Logistics System (CLS) integrates three core functions: intelligent business planning and marketing management, integrated courier scheduling and intelligent order dispatching, and intelligent operational optimization, achieving a synergistic effect across the core business chain. This enables optimal matching between orders and couriers across different industries, scenarios, and complex delivery networks, significantly improving logistics efficiency and effectively solving the problems of delayed visibility tracking and untimely information feedback, thus providing strong support for the development of cross-border e-commerce logistics.

To overcome the dilemma of coordinating multiple warehouses across different countries, the key is to establish a digital cross-border logistics system that integrates the "three flows" (information flow, logistics flow, and capital flow). On a technical level, a real-time global warehouse visualization system should be built based on blockchain-driven distributed ledger technology to achieve millisecond-level synchronization of inventory data. On a management level, a cross-time-zone window workflow engine should be introduced to automatically plan command delivery paths based on global time zone distribution, compressing coordination delays to within a few hours. To address the talent shortage, a "technology + language + trade" three-dimensional competency model should be established. By co-establishing cross-border supply chain academies with universities, a talent pipeline of versatile professionals proficient in intelligent warehousing systems, cross-cultural communication, and international trade rules can be cultivated.[10]

6.3 Building a Data-Driven Elastic Supply Chain System

To address the problem of inventory overstock, a three-tier control mechanism of "demand sensing - dynamic replenishment - flexible allocation" needs to be established. On the demand side, a spatio-temporal big data fusion analysis model should be used to integrate multi-dimensional data such as historical sales, social media popularity, and regional economic indices to generate accurate demand heat maps. On the supply side, a self-adapting algorithm for safety stock should be adopted to automatically adjust replenishment thresholds based on sales volatility. At the operational level, a "dual-circulation inventory strategy" should be implemented: core products will use a "forward deployment to overseas warehouses" approach to ensure a basic supply, while long-tail products will use a "free trade zone warehouse + international express" model to achieve on-demand response, significantly improving inventory turnover rates.

SF Express provides an excellent solution, demonstrating how to achieve supply chain intelligence and automation through digital technology. Building on a digital supply chain, they have integrated cutting-edge technologies like digital technology, artificial intelligence, the Internet of Things, and cloud computing to create an intelligent system called "Fengzhi Yunce." This system is comprehensively applied in key areas such as warehouse network planning, supply chain planning, inventory management, transportation, and packaging. This has not only greatly enhanced the elasticity, efficiency, and resilience of the supply chain but, for example, in warehouse network planning, the "Fengzhi Yunce" system ensures the efficient and stable operation of the logistics network through scientific layout, thereby guaranteeing the coordination and smooth operation of all links[11].

6.4 Building a Localized Ecological Network

To effectively break through localization barriers, the core lies in building a "three-in-one" regional adaptation system that integrates "products, services, and compliance." This requires companies to deeply explore local characteristics in product development to form a regional product matrix; to deeply integrate into the local payment and after-sales ecosystem in service provision; and to use a machine learning-driven dynamic policy response engine for compliance management to intelligently analyze customs regulations and optimize clearance processes. The aim is to comprehensively build a localized ecological network, significantly improve the company's information management level and big data forecasting capabilities, and ultimately achieve efficient localized operations tailored to local conditions, avoiding unnecessary resource investment.

Specifically at the regional level: in the Asian market, the focus will be on increasing self-operated outlets and achieving full self-operation coverage in core cities in Southeast Asia, Japan, and South Korea. For Singapore, customs clearance and transit will be accelerated to enhance next-day delivery services. In Thailand, the local express delivery network will be continuously optimized through technology empowerment to improve service efficiency and standardization, thereby

strengthening cross-border business capabilities. In the European and American markets, the focus will be on building stable last-mile delivery fulfillment capabilities through deep cooperation with local logistics partners.

6.5 Human Resources and Resilient Development Framework Construction

To meet the urgent demand for versatile talent in the cross-border e-commerce field, universities should actively play a core role in talent cultivation. Specifically, universities can respond to national policies by establishing cross-border e-commerce-related majors and organizing a series of activities, such as inviting industry experts and corporate executives to give lectures and training sessions to share the latest industry trends and technological applications, thereby broadening students' horizons and enhancing their professional skills. At the same time, by organizing students to participate in competitions and projects in the cross-border e-commerce and logistics fields, their innovation and teamwork abilities can be cultivated. Given the shortage of versatile talent for China's overseas warehouses and the higher requirements for professional knowledge, skills, and qualities in cross-border logistics positions, deep cooperation between enterprises and universities is crucial. Both parties can co-establish practical training bases to provide internship opportunities for students majoring in logistics management and jointly cultivate international talent for smart logistics.

Furthermore, to effectively cope with risks at the institutional and technological levels, enterprises urgently need to build a "dual-wheel drive" resilience system. At the institutional level, a "policy testbed" mechanism should be explored, for example, by piloting mutual recognition of customs supervision under the RCEP framework and promoting the standardization of a "pre-declaration + intelligent inspection and release" model. At the technological level, a "reverse logistics cloud platform for returns and exchanges" should be built to replace cross-border returns with internal transfers within the overseas warehouse network, thereby significantly reducing processing costs. At the same time, offshore settlement centers should be developed in parallel, making full use of financial hubs like Hong Kong and Singapore to achieve multi-currency asset allocation and effectively hedge against exchange rate fluctuation risks[12].

7. Conclusion

Facing the white-hot competition in cross-border e-commerce, overseas warehouses are becoming the core driving force for achieving leapfrog development in cross-border logistics. By fulfilling orders directly at the destination of sale, they effectively break through the time and space constraints of traditional logistics, greatly improving the efficiency of product delivery. This not only significantly enhances the consumer experience but also activates the cross-border consumption market, greatly expanding the global trade map.

The booming development of cross-border e-commerce and the deep integration of the overseas warehouse system have become key variables in reshaping the global trade order. This study systematically reviews the evolutionary trajectory and structural dilemmas of China's overseas warehouses, deeply revealing the underlying logic behind challenges such as cost pressures, cross-national coordination obstacles, inefficient inventory, and insufficient local adaptability — namely, the contest between global supply chain capabilities and digital governance capabilities. To this end, the study proposes the construction of a strategic system centered on "operational optimization, institutional innovation, and technological empowerment" to address these dilemmas. Currently, the window of opportunity for industry transformation is narrow. We see successful examples like SF Express's CLS system and WINIT's virtual warehouse, which demonstrate the potential for cost control and fulfillment within 48 hours. We also face intensifying trade barriers in emerging markets and competitive imbalances caused by uneven development of digital technology. Therefore, only through the synergistic effect of the three pillars — policy guidance, industry standard setting, and ecosystem integration — can overseas warehouses be transformed from mere cost centers into value-creating profit centers. This will ultimately lay a solid, resilient logistics foundation for the global layout of "Made in China" and inject sustained vitality into the "dual circulation" new development pattern.

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