Journal of Applied Economics and Policy Studies Vol.18 Issue 7 EWA Publishing
Available Online: 29 July 2025 DOI: 10.54254/2977-5701/2025.25472

A study on inventory cost management in cross-border e-commerce

Ruilin Feng

Shanghai Lixin School of Accounting and Finance, Shanghai, China

1713096470@qq.com

Abstract. This study systematically explores the inventory cost management system of cross-border e-commerce, with a focus on analyzing key cost components such as procurement, logistics, and warehousing. It identifies critical issues including data silos, demand forecasting deviations, and cross-border operational risks, and proposes targeted solutions. Strategies such as building integrated data platforms, implementing intelligent replenishment algorithms, optimizing warehouse network layouts, and establishing supply chain collaboration mechanisms are proposed. These approaches aim to address the high operational costs and extensive management issues faced by small and medium-sized cross-border e-commerce enterprises, ultimately facilitating inventory efficiency optimization and compliance-oriented development.

Keywords: cross-border e-commerce, inventory management, cost control

1. Introduction

1.1. Research background

As of April 2025, the State Council has established 178 cross-border e-commerce comprehensive pilot zones across 31 provinces, autonomous regions, and municipalities, forming a development pattern characterized by land-sea coordination and mutual support between the eastern and western regions. The cross-border e-commerce industry is currently undergoing a crucial stage of development, driven by continued globalization and digital transformation. The widespread adoption of overseas warehouse models has significantly improved logistics and delivery efficiency, while trade facilitation measures—such as the Regional Comprehensive Economic Partnership (RCEP)—have created favorable conditions for the industry's growth. At the same time, the deep integration of big data and artificial intelligence is reshaping supply chain management systems.

As the industry expands into emerging markets and transitions toward greener practices, it faces dual challenges of regulatory compliance and regional heterogeneity. These factors directly affect inventory management, requiring enterprises to integrate intelligent forecasting technologies with localized operations to improve inventory turnover while ensuring compliance—ultimately building a sustainable inventory management system.

1.2. Research significance

With the rapid development of the cross-border e-commerce industry, enterprises are under pressure from multi-dimensional costs such as procurement, logistics, warehousing, and tariffs, as well as management challenges including data fragmentation, inaccurate forecasting, and cross-border operational risks. In response, this paper proposes strategies such as building a unified data platform, optimizing inventory layout, leveraging big data for demand forecasting, and enhancing supply chain collaboration. These approaches aim to reduce inventory backlogs and improve capital turnover efficiency, especially helping small and medium-sized sellers overcome high costs and extensive operations. Ultimately, the goal is to promote a transition toward refined and sustainable development in the cross-border e-commerce sector.

2. Inventory cost composition and current management status in cross-border e-commerce

2.1. Inventory cost components

2.1.1. Procurement costs: balancing bulk purchase discounts and inventory backlog; impact of exchange rate fluctuations on procurement prices

Cross-border e-commerce enterprises face multiple strategic choices at the procurement stage. To secure volume discounts from suppliers, companies often adopt centralized purchasing strategies to reduce the unit cost of products. However, this approach carries significant risks: when enterprises rely solely on experience or fail to accurately assess market trends—such as neglecting regional demand differences, seasonal fluctuations, or product life cycles—it can easily lead to slow-moving or excess inventory. This not only causes warehousing costs to rise (including overseas warehouse rents and long-term storage fees) but also ties up large amounts of working capital.

In terms of cross-border settlements, procurement contracts priced in foreign currencies (e.g., USD or EUR) expose companies to exchange rate risk. When the RMB experiences sharp short-term fluctuations, procurement costs increase accordingly, directly eroding profit margins [1]. For small and medium-sized cross-border sellers with limited financial capacity, the absence of professional tools for managing exchange rate risk (such as forward exchange contracts or other financial derivatives) makes it difficult to lock in procurement costs effectively, resulting in significant discrepancies between actual operational costs and budgets.

2.1.2. Logistics costs: freight and handling fees

The logistics cost structure in cross-border e-commerce is composed of several key stages. During the first-leg transport stage, enterprises must bear the full cost of moving goods from domestic suppliers to overseas warehouses. These costs include basic transportation charges and a variety of surcharges [2]. Basic freight charges are typically calculated based on volume and weight for sea freight, or cargo space pricing for air freight. Surcharges may include fuel surcharges, congestion fees during peak seasons, and special handling fees for restricted goods such as hazardous materials.

The cost of last-mile delivery arises from the local distribution of goods from overseas warehouses to end consumers. This cost structure varies significantly depending on the infrastructure development of the target market. In developed markets such as Europe and North America, standardized courier fee systems dominate, while in emerging markets such as Southeast Asia, specialized pricing schemes for dedicated logistics lines are more common. Specific fees include base delivery charges, surcharges for remote areas, and premiums for expedited delivery services. At logistics nodes, additional expenses such as container loading and unloading fees, as well as Less than-Container-Load (LCL) consolidation or deconsolidation charges at international ports, represent major cost components. Moreover, handling and transfer fees also arise during the exchange of goods between domestic collection warehouses and international freight forwarders. These fees are typically calculated based on the characteristics of the goods, including basic parameters such as weight and volume, as well as additional charges for large or irregular items requiring special handling equipment.

2.1.3. Warehousing costs: overseas warehouse rental and Warehouse Management System (WMS) fees

Overseas warehousing costs generally consist of two parts: fixed and variable costs. Fixed costs include site lease expenses or amortized investments in self-built warehouses, while variable costs arise under third-party warehousing service models, which typically charge based on storage volume, weight, and duration.

Enterprises of different scales face different warehousing model choices. Self-built warehouses require upfront investment in site selection, facility renovation, and equipment installation [3]. Given the high rents in core commercial zones of Europe and the U.S., this model is more suitable for large sellers with stable operations who can amortize the investment over the long term. Platform-based warehousing services such as Fulfillment by Amazon (FBA) adopt standardized pricing, charging fees based on storage space and duration, and imposing additional fees for long-stored or unsold inventory. Third-party warehousing services provide more flexible pricing structures that include base rent as well as in-warehouse handling fees. The cost level varies significantly depending on the location and type of service—for example, warehousing costs in Southeast Asia tend to be relatively low.

Regarding warehouse management systems, enterprises must select solutions based on their operational needs. Standardized Enterprise Resource Planning (ERP) systems typically operate on a subscription model, charging monthly or annual fees based on the number of accounts or order volume. While they generally cover essential functions such as inventory synchronization and order management, integration across multiple platforms may incur extra fees. Customized WMS solutions, on the other hand, require higher initial development costs and ongoing investment in system maintenance and data security. Advanced

modules such as inventory forecasting and intelligent replenishment usually require separate purchases, and the development of interfaces for integration with logistics providers or suppliers' systems can also lead to additional expenses.

2.1.4. Tariffs (export and import duties)

Tariff policies in the export segment of cross-border e-commerce exhibit clear country-specific variations. Within China, cross-border e-commerce export goods generally enjoy a "no-invoice, tax-exempt" policy, particularly under the verified taxation model implemented in designated cross-border e-commerce pilot zones. However, it is important to note that certain countries and regions—motivated by industrial protection or environmental concerns—impose specific export duties on particular categories of goods, such as resource-based or high-value products. A typical example is the EU's environmental tax on certain electronic products.

Import duties are levied by customs authorities in the destination country or region when goods enter the local market. These are calculated based on the product's classification (HS code), dutiable value (CIF price), and the applicable local tariff rate. Thresholds for duty exemptions vary widely by country. Goods below the exemption threshold are duty-free, while those exceeding it are subject to either ad valorem tax or specific duty (e.g., some daily-use products are taxed based on weight).

2.1.5. Capital occupancy costs: opportunity costs from prolonged inventory turnover

Compared with domestic e-commerce, cross-border operations often involve longer inventory turnover cycles, resulting in significant opportunity costs from capital being tied up in inventory. When inventory turnover days increase, large amounts of working capital become immobilized, rendering it unavailable for strategic investments such as market expansion, product development, or marketing. This capital lock-up not only results in direct financial costs—such as loan interest or lost investment returns—but also causes missed market opportunities and difficult-to-quantify hidden losses. This issue is particularly severe for enterprises using overseas warehouses, where the cycle from stock preparation to sales revenue realization is significantly longer. If inventory turnover is poor, funds may remain tied up overseas for extended periods, further exacerbating cash flow pressures.

Inefficient use of inventory capital can also trigger a chain reaction. Enterprises dependent on external financing may face higher financial costs due to slow turnover. Unsold seasonal products may tie up capital for long durations, and cross-border capital flow restrictions may delay fund repatriation. These factors, when compounded, not only erode profit margins but also strain the company's overall financial stability. Therefore, cross-border e-commerce enterprises must establish scientific systems for evaluating inventory capital costs and fully consider the comprehensive cost of capital occupancy in their inventory decisions.

2.1.6. Losses from unsalable inventory: overseas disposal fees

Dealing with unsellable inventory in overseas markets imposes considerable cost pressures on cross-border e-commerce enterprises. When inventory becomes unsellable due to prolonged stagnation, damaged packaging, or compliance issues (e.g., labeling errors or expired certifications), companies often must arrange for disposal in the destination market. This process involves not only direct destruction costs—such as environmental processing and landfill/incineration fees—but also indirect costs, including labor for sorting and logistics expenses to transport goods to disposal sites [4]. This is especially problematic for regulated goods like food or cosmetics, which must be destroyed once they exceed their shelf life or fail to meet local regulatory requirements, resulting in the enterprise absorbing the full cost.

The unique nature of overseas disposal adds further complexity and expense. Compared with domestic handling, overseas disposal is hindered by language barriers, opaque operational procedures, and heavy reliance on local third-party service providers. These factors often drive per-unit disposal costs to two to three times those incurred domestically. Moreover, a lack of familiarity with local environmental regulations can result in additional fines for non-compliant disposal practices, further increasing total handling costs. These cross-border characteristics make post-sale management of unsellable inventory a critical consideration in the cost control of cross-border e-commerce supply chains.

2.1.7. Abnormal losses: fire, mold, moisture, and force majeure

Abnormal inventory losses in cross-border e-commerce operations are characterized by their sudden onset and high destructiveness. These losses primarily stem from two categories of causes: first, damage to goods resulting from warehousing management deficiencies or inadequate environmental adaptation—such as fires, mold, or moisture issues; and second, force majeure events such as geopolitical conflicts or natural disasters. Given the complexity of cross-border supply chains and the difficulty in assigning liability, such losses often result in a complete write-off or significant devaluation of inventory, causing substantial operational disruptions for enterprises. What makes these losses particularly challenging is their unpredictability and

the intricate processes required to handle them in cross-border contexts. These characteristics make abnormal inventory losses one of the most difficult and critical aspects of inventory cost control in cross-border e-commerce.

2.2. Current inventory management challenges

2.2.1. Information asymmetry: fragmented inventory data across multiple platforms

Cross-border e-commerce enterprises commonly face difficulties in integrating data across multiple platforms[7]. Due to significant differences in order processing rules, promotional policies, and data formats among platforms such as Amazon, Shopee, and independent websites, companies are often forced to manually export order, refund, and review data from each platform, and then manually match it with internal systems. This results in delays exceeding 48 hours in the availability of key business information—most notably, inventory data often fails to update in time after promotional campaigns, leading to overselling.

For small and medium-sized sellers, data management challenges are even more severe. Their daily operations rely heavily on Excel spreadsheets to consolidate data across platforms, often requiring 3–5 hours of manual processing each day. Differences in data structures—especially inconsistent Stock Keeping Unit (SKU) coding systems—further increase the likelihood of data errors and omissions.

At present, the fragmentation of multi-platform data has evolved from a barrier to operational efficiency into a threat to business survival. Without integrated systems, front-end business data (orders, inventory, user behavior) remains isolated, and back-end functions (finance, compliance, supply chain) are forced to rely on manual corrections. This creates a vicious cycle of "data silos → operational redundancy → delayed decision-making". In the absence of automated data integration tools, small sellers are caught between the inefficiencies of rudimentary operations and the high costs of manual management—severely undermining their competitiveness in the global market.

2.2.2. Forecasting bias: experience-based replenishment leads to overstock or stockouts

The cross-border e-commerce industry is currently hindered by significant technical and financial barriers. Mainstream data analytics tools—such as intelligent product selection systems and demand forecasting platforms—are often costly and complex to implement. Constrained by limited capital and technical capabilities, small and medium-sized sellers are more inclined to rely on traditional experience-based decision-making rather than adopting digital tools.

At the same time, most enterprises suffer from underdeveloped digital infrastructure. They lack unified management platforms that can integrate order, inventory, and supply chain data, resulting in severely limited data collection and analytical capacity. As a result, replenishment strategies are largely dependent on subjective judgment—a reactive measure stemming from a lack of data capability—and are unable to respond flexibly to market fluctuations.

The absence of end-to-end data support—from demand insight to supply chain coordination—traps businesses in a dilemma between inventory overstock and frequent stockouts, becoming a major barrier to refined operations. This challenge is especially acute among small and medium sellers, underscoring the urgent need for cross-border e-commerce enterprises to shift from a traditional “experience-driven” approach to a modern, "data-driven" operational model.

2.2.3. Cross-border risks: political, regulatory, market, and operational risks

The cross-border e-commerce industry is facing increasingly complex risks associated with multinational operations, which mainly stem from three aspects: policy and trade environment, fiscal and financial management, and localized market operations. At the policy level, global trade protectionism continues to intensify, with many countries raising barriers to cross-border trade through measures such as tariff increases and the establishment of technical trade barriers. Policy changes such as the European Union Value-Added Tax (EU VAT) reform and new product safety certification regulations in the U.S. force enterprises to continually adjust their compliance strategies; otherwise, they risk operational consequences like product delisting and account freezes. Meanwhile, geopolitical turbulence caused by the Russia-Ukraine conflict and Middle East instability has disrupted international logistics, seriously threatening supply chain stability.

In terms of fiscal and tax management, differentiated tax policies across countries impose enormous compliance pressures on enterprises. The increased complexity of cross-border tax procedures following Brexit and foreign exchange controls in emerging markets directly affect companies’ cash flow and profit returns. Furthermore, cultural differences in market operations cannot be overlooked. From religious compliance requirements in Middle Eastern markets to environmental packaging standards in Europe, these localized characteristics require companies to continuously invest in adaptive research and development as well as operational resources.

These risks intertwine to form a unique "cross-border, multidimensional" profile: political risks arise from geopolitical conflicts and policy uncertainties; policy risks are concentrated in taxation and regulatory fields; market risks manifest as

demand fluctuations and localization challenges. For small and medium-sized cross-border e-commerce enterprises with limited resources, it is essential to establish systematic defense mechanisms—comprising policy monitoring and early warning, modular compliance management, and dynamic market adjustments—to effectively control their risk exposure in global operations.

2.2.4. Logistics risks: delivery delays and cost volatility

The cross-border e-commerce logistics system faces multiple operational risks, with its complexity primarily reflected in the vulnerability of the entire supply chain. The logistics process includes three major stages: first-mile transportation, cross-border customs clearance, and last-mile delivery. Each node can become a potential source of delivery delay risk [5]. Regarding first-mile transportation, maritime shipping is often constrained by port operational efficiency. Sudden incidents such as labor disputes on the U.S. West Coast or blockages in the Suez Canal, combined with force majeure events like typhoons, significantly prolong the time required for goods to reach warehouses. Last-mile delivery is limited by the logistics infrastructure level at the destination; in emerging markets such as Southeast Asia, the underdeveloped "last-mile" delivery networks often cause delays in final delivery.

Reverse logistics management faces even greater challenges. Since cross-border returns and exchanges involve complicated multinational transportation processes, and localized processing centers are generally lacking in markets like the Middle East, consumers often endure lengthy waiting periods. In terms of cost control, all types of transportation modes exhibit noticeable fluctuations: sea freight prices fluctuate with fuel costs and the supply-demand balance of containers, with frequent surges during peak seasons; air freight costs are influenced by aviation fuel surcharges and capacity allocation; dedicated logistics lines, which depend on local service providers, not only lack price transparency but are also susceptible to regional monopolies and policy changes.

These risk factors collectively constitute the core pain points in cross-border e-commerce logistics: on one hand, the complexity of multi-stage coordination, limitations of transportation modes, and insufficient supply chain collaboration make it difficult to guarantee timeliness; on the other hand, freight rate volatility, warehouse efficiency, and reverse logistics issues cause uncontrollable costs. This coexistence of "timeliness risk" and "cost risk" imposes severe operational pressure on resource-constrained small and medium-sized cross-border e-commerce enterprises.

3. Inventory optimization strategies

3.1. Unified information

Establish a unified inventory management platform that interfaces with various e-commerce platforms to achieve real-time data synchronization; alternatively, adopt an ERP system integrating multi-platform management functions to centrally consolidate and analyze inventory data.

By building a unified data platform, cross-border e-commerce enterprises can effectively integrate data resources across supply chain segments, achieving end-to-end business collaboration. This platform connects information systems of suppliers, overseas warehouses, and logistics service providers, creating a data link that spans procurement, warehousing, and distribution processes. Based on real-time dynamic inventory data analysis, companies can implement scientific warehouse network optimization strategies—for example, concentrating high-turnover products in overseas warehouses located in core consumer markets. This approach significantly shortens delivery distances, reduces product damage during transportation, and structurally optimizes logistics costs.

An ERP system with integrated multi-platform management functions refers to a system that achieves unified operation management through technical integration. This system consolidates data and business processes from various e-commerce platforms, warehousing and logistics, financial settlement, and compliance management to build a full-chain collaborative management system.

Cross-border e-commerce ERP systems realize real-time synchronization and interaction of multi-platform data through standardized data interfaces, effectively solving inventory management challenges arising from multi-platform operations [6]. The system instantly synchronizes orders, inventory, and product information from all sales channels, avoiding issues such as overselling or duplicated stock caused by data delays or fragmentation, thereby significantly improving inventory management efficiency. Its global inventory visualization function provides precise inventory monitoring capabilities, enabling enterprises to optimize stocking strategies, reduce overseas warehouse storage fees and losses from slow-moving inventory, and effectively control inventory costs. Through data-driven decision support, it helps cross-border e-commerce companies achieve refined management and cost optimization.

3.2. Inventory layout optimization: localization and agility

3.2.1. Overseas warehouse site selection model

The site selection of overseas warehouses for cross-border e-commerce requires establishing a multidimensional evaluation model, with the primary consideration being the consumption characteristics and business suitability of the target market. Mature markets such as Europe and North America have high e-commerce penetration and strong purchasing power, while emerging markets like Southeast Asia exhibit robust growth potential. Core indicators to be comprehensively assessed include local population size, internet penetration, and purchasing power. Additionally, product category characteristics directly influence site selection decisions. High-value goods necessitate a focus on logistics security conditions; fresh produce relies heavily on the quality of cold chain infrastructure; and bulky items require matching local delivery network coverage.

The completeness of logistics infrastructure is a critical factor in site selection. Priority should be given to areas near major transportation hubs to effectively control transportation costs, including reducing short-haul fees in first-mile transport and shortening last-mile delivery times. On the implementation level, in-depth field investigations should be conducted through communication with local logistics providers and commercial institutions to understand actual operating cost structures and potential risk factors such as regional energy supply stability or geopolitical risks. Policy compliance reviews are equally essential, with key focus areas including equity restrictions on foreign-owned warehouses and data storage regulations.

A scientific site selection process should adopt a phased approach: first, screening target countries based on market strategic positioning; then, determining specific locations by considering urban infrastructure, policy support intensity, and maturity of industrial clusters. Furthermore, competitive landscape and supply chain synergy effects must not be overlooked—avoiding homogeneous competition in areas densely populated with competitors, while emphasizing geographic synergy with industrial zones or supplier clusters to optimize replenishment efficiency and after-sales service responsiveness. This systematic site selection method effectively balances market opportunities with operational risks, providing scientific decision support for overseas warehouse layout in cross-border e-commerce.

The overseas warehouse site selection requires comprehensive consideration of locational advantages and market demand. The layout strategy of large e-commerce enterprises such as JD.com provides a demonstrative example [3]. JD.com's overseas warehouse deployment in Southeast Asia reflects strategic site selection. It prioritizes warehouses at maritime hubs like Port Klang, fully leveraging port logistics advantages to reduce cross-border shipping costs; simultaneously, it establishes warehouse networks in consumption centers such as Jakarta and Manila, reducing delivery times from two weeks to three days, significantly enhancing the consumer experience. This layout also helps avoid compliance risks associated with direct cross-border shipping by meeting local storage requirements in Indonesia. The JD.com case demonstrates that overseas warehouse site selection must balance three key elements: logistics efficiency, market coverage, and policy compliance.

3.2.2. Reducing last-mile delivery costs based on big data analysis of consumer distribution

Cross-border e-commerce companies should optimize their warehousing network layout based on market demand analysis [2]. For core consumer regions with dense order volumes, a proximity-based warehousing strategy should be adopted by establishing storage nodes in key cities or surrounding areas. This approach shortens the delivery radius, improves logistics efficiency, and reduces transportation costs. Such precise warehouse placement can effectively reduce resource consumption in the last-mile delivery phase while enhancing the service experience for end consumers.

For high-growth potential markets, a gradual deployment strategy can be implemented. By establishing hub-and-spoke warehousing centers in nearby hub cities, enterprises can efficiently cover emerging surrounding markets. This model avoids the high costs of standalone warehouses and simultaneously responds promptly to regional market demand changes, achieving a balance between cost control and market expansion.

Operational localization is a critical success factor for cross-border e-commerce. Establishing multilingual customer service systems in non-English-speaking markets and optimizing service content through analysis of consumer inquiry data can significantly reduce operational losses caused by communication barriers. Additionally, compliance preparations such as product coding alignment and tax regulation readiness must be made in advance, especially in tariff-sensitive regions like the UK and India, to ensure smooth customs clearance.

In the face of increasingly stringent environmental regulations worldwide, cross-border e-commerce enterprises need to build intelligent green supply chain systems. In regions with strict environmental oversight such as the European Union, data-driven forecasting should guide packaging material procurement decisions, prioritizing the use of biodegradable packaging that meets local standards. This forward-looking compliance management not only mitigates policy risks but also achieves sustainable cost optimization, enhancing the enterprise's overall competitiveness.

3.3. Integrating data to reduce forecasting errors: using big data analytics to consolidate multi-channel data such as platform sales and market trends to build demand forecasting models and develop replenishment strategies accordingly

Cross-border e-commerce enterprises can utilize big data analytics tools to build multidimensional data systems to guide replenishment decisions. Platform sales data serve as the most direct reference, including core indicators such as historical order volumes across channels, product sales rankings, regional sales shares, and customer repurchase rates. These data accurately reflect actual consumer demand and purchasing preferences. Simultaneously, market trend analysis should be integrated, leveraging external data sources such as search engine popularity, industry research reports, and social media dynamics to timely capture category trend changes and competitive market conditions, providing directional guidance for proactive stocking.

In-depth mining of user behavior data can reveal potential market opportunities. Analyzing consumers' browsing paths on the platform, abandoned cart items, and search keywords enables identification of unmet consumer needs, offering clues for product portfolio optimization and new product development. Additionally, supply chain operational data is equally indispensable, including real-time overseas warehouse inventory, logistics delivery times, and supplier capacity status—critical information directly impacting the feasibility and execution of replenishment plans.

Based on comprehensive analysis across these data dimensions, enterprises can establish scientific demand forecasting models and develop differentiated replenishment strategies. This data-driven decision-making approach avoids inventory deviations caused by empiricism and swiftly responds to market changes, achieving a dual optimization of inventory turnover efficiency and sales opportunity capture.

3.4. Supplier and logistics collaboration: establishing inventory warning systems and dynamically adjusting first-leg shipping plans

Cross-border e-commerce supply chain collaboration requires establishing a bidirectional data sharing mechanism. Enterprises need to provide logistics service providers with demand-side data such as real-time inventory levels, safety stock thresholds, historical sales fluctuations, and future sales forecasts. Conversely, logistics providers must feedback supply-side information including transportation resource status, transit times and capacities of different transport modes, and changes in customs clearance policies [5]. This data interchange eliminates information asymmetry and enables both supply and demand sides to make coordinated decisions based on a unified supply chain view, effectively identifying and mitigating potential inventory risks.

Based on the analysis of shared data, supply chain operations can implement differentiated response strategies. Under normal conditions, the predetermined transportation plans are executed; upon detecting potential risks, critical logistics resources are locked in advance; and emergency transport plans are activated during unforeseen incidents. By integrating dynamic data such as port operation efficiency and policy constraints in real time, intelligent algorithms can recommend optimal logistics routes that balance transportation costs and risks while meeting timeliness requirements.

Data-driven supply chain collaborative management follows a systematic implementation process. It begins with establishing regular data synchronization mechanisms to ensure timely updates of foundational information; next, data analytics identify inventory anomalies and capacity gaps; finally, transportation plans are dynamically adjusted according to analysis outcomes, with continuous monitoring of execution effectiveness. This closed-loop management model significantly enhances supply chain agility and resilience, providing a stable operational guarantee for cross-border e-commerce.

Case Study: Supplier and Logistics Collaboration

DHL, a global leader in logistics services, has professional advantages in cross-border logistics solutions. Its strategic partnership with Cainiao Network has built an intelligent global logistics system that effectively resolves logistics bottlenecks faced by cross-border e-commerce. Cainiao leverages consumer data from Alibaba’s platform to provide demand forecasts, while DHL offers global hub warehouse resources and achieves intelligent stocking and inventory allocation through system integration. This collaboration deeply integrates data and physical logistics. Forecast-driven pre-stocking alleviates peak season logistics pressure, while dynamic inventory optimization reduces the risk of excess stock, providing an innovative solution for the industry. The complementary strengths of both parties jointly enhance the timeliness and stability of cross-border e-commerce logistics.

3.5. Reverse logistics cost control: optimizing return and exchange processes

Cross-border e-commerce reverse logistics management requires establishing systematic optimization strategies. Improving product descriptions and strengthening quality control at the source are the most effective ways to reduce return rates caused by product misperception or functional issues, thereby decreasing reverse logistics volume [6]. Setting up centralized return processing centers in target markets can consolidate dispersed return flows, significantly lowering per-item processing costs through economies of scale while improving processing efficiency.

Grading and managing returned goods is a key step for value recovery. Products are categorized based on their actual condition: resalable items are repackaged and reintroduced to the market; repairable products undergo technical treatment; completely damaged goods are dismantled for reusable parts. This multi-level disposal approach maximizes the residual value of returned goods. Such refined operations can transform what is traditionally a cost center into a potential profit source.

Building a localized reverse logistics network is crucial for efficiency improvement. By leveraging existing overseas warehouse facilities to establish regional return centers, companies can achieve local collection, processing, and resale of returned goods, creating a complete regional closed-loop system. This model reduces cross-border transportation steps and accelerates the turnover of returned goods. Overall, reverse logistics management in cross-border e-commerce should follow the principles of "prevention first, localization preferred", systematically lowering reverse logistics costs through a combination of source control and regional operations. Return rate analysis can also be used to optimize product selection and description details in reverse.

For example: IKEA's member points incentive program in the U.S. market offers an innovative solution for managing reverse logistics of bulky items. By incentivizing customers with membership points to dismantle large returned products themselves, IKEA achieves dual optimization of logistics cost and efficiency. Data shows that transportation costs for dismantled bed frame returns drop to one-third of the original cost, mainly due to volume reduction allowing for more efficient transport modes. This model simplifies the traditionally 2–3 day professional disassembly and return process into a standardized return handling completed within 24 hours. By empowering consumers to participate in value creation, this innovative mechanism effectively addresses the high-cost pain points of bulky goods reverse logistics and provides a replicable solution for the retail industry.

3.6. Policy monitoring and timely adjustment: staying alert to international political risks

Cross-border e-commerce enterprises need to establish a systematic policy risk management framework. By forming cross-departmental policy research teams that integrate expertise from legal, operations, and logistics sectors, companies can continuously track regulatory developments in target markets—covering critical areas such as tariff policy adjustments, customs supervision requirements, and data protection regulations. This collaborative working mechanism ensures timely awareness of policy changes and provides a sound basis for strategic decision-making.

Proactively expanding government-business communication channels is an effective way to anticipate policy trends [7]. Leveraging the platform advantages of comprehensive cross-border e-commerce pilot zones, enterprises can establish normalized communication mechanisms with regulatory authorities to access pilot policy information in advance, such as innovations in export customs clearance models and other cutting-edge developments. Through such forward-looking policy research, companies can prepare thoroughly before regulations are officially implemented, thereby reducing the passivity of compliance adjustments.

Scientific policy risk assessment forms the foundation for developing response strategies. Based on the impact severity and urgency of policy changes, risks should be classified into high, medium, and low levels, with differentiated response plans tailored accordingly. For policy adjustments that may cause significant impact—such as substantial tariff hikes or raised compliance thresholds—special response mechanisms must be activated; for general process optimizations or subsidy adjustments, these can be incorporated into routine operational improvements. This hierarchical management model enables optimized allocation of resources in responding to policy risks.

4. Conclusion and recommendations

Cross-border e-commerce inventory management faces multidimensional operational challenges, including procurement cost control, logistics efficiency optimization, and warehousing network layout. Factors such as data silos, demand forecasting deviations, and cross-border policy risks further complicate management, often placing resource-constrained small and medium sellers in a dilemma between operational efficiency and cost control [4].

To address these issues, enterprises can adopt systematic solutions. First, they should establish integrated ERP management platforms to achieve unified control over multi-channel inventory data. Second, big data analytics technologies should be utilized to improve demand forecasting accuracy and reduce subjective decision-making biases. Third, based on consumer market characteristics and logistics infrastructure conditions, overseas warehouse layouts should be scientifically planned, alongside building efficient localized reverse logistics systems. Additionally, establishing collaborative early-warning mechanisms with logistics service providers enables dynamic optimization of transportation plans, complemented by a refined value-based grading management system for returned goods. In terms of risk prevention and control, companies need to develop normalized policy monitoring mechanisms. By leveraging policy coordination channels in cross-border e-commerce pilot zones, enterprises can prepare in advance for compliance, thereby comprehensively enhancing the precision and refinement of inventory management.

References

[1] Yu, J. (2025, April 14). Cross-border payments face tariff challenges. *International Finance News,* (006).
[2] Chen, Y. (2025). Research on the current situation and countermeasures of international logistics under the background of cross-border e-commerce. *China Logistics & Purchasing*, (04), 113–114.
[3] Zhou, G., & Zhuang, X. (2024). Research on overseas warehouse construction models of China's cross-border e-commerce under the modernization of the circulation industry. *Bohai Economic Outlook*, (12), 69–72.
[4] Ruan, Z. (2021). Exploration of the application of management accounting in financial management of cross-border e-commerce enterprises. *Accountant,* (21), 32–34.
[5] Lei, S., & Lu, Y. (2024). Research on cost management and control strategies in cross-border e-commerce logistics. *China Logistics & Purchasing,* (20), 24–25.
[6] Jiao, W. (2024). New directions in international supply chain logistics management from the perspective of cross-border e-commerce. *China Logistics & Purchasing,* (19), 71–72.
[7] Wang, T. (2024). Research on financial management strategies of cross-border e-commerce enterprises. *Modern Business*, (15), 168–170.