

Cross-Border E-commerce Logistics System Optimization Analysis

Qinya Li^{1,a,*}

¹EHL Hospitality Business School, Lausanne, 1000, Switzerland

a. Qinya.Li@ehl.ch

**corresponding author*

Abstract: Cross-border e-commerce is a rapidly growing market segment that means high-quality logistic support for long-term growth. This paper investigates the peculiarities of present cross-border e-commerce logistics conditions, defines existing challenges, and suggests improvement ideas. In this case, the study reviews literature and case studies to examine the issues affecting cross-border logistics, including long transit times, high freight costs, and bureaucratic formalities in accessing various customs. This research is designed to help readers understand the specific forces that affect logistics configuration and suggest methods to improve the performance and quality of the logistics services being delivered to customers. Through the realization of these optimization measures, the study will aim to play a significant role in enhancing the sustainable growth of the cross-border e-commerce sector and preventing it from being out-competed in the world market. The findings of this research highlight the critical strategies and technological innovations necessary to address these challenges and demonstrate their potential to improve logistics efficiency and reduce costs significantly.

Keywords: E-commerce, cross-border transport, service system, post-sale optimization, long-run productivity

1. Introduction

Cross-border e-commerce (CBE) is one of the recent trends in the global purchasing and selling of goods and services since it has experimented with new ways of conducting business all over the world. This has enabled new companies of all sizes to market their goods and services to consumers across the globe, eradicating restrictions and hurdles that used to limit the international market. A logistic system is, therefore, an ingenious component of this transition process and acts as a framework supporting the e-commerce environment. Effective flow has an impact not only on delivering the services or products on time but also on increasing customers' satisfaction and decreasing organizational expenses more than other functional activities.

Nevertheless, the logistics system of CBE has its issues that can be quite dissimilar to that of the United States. Some of these issues are the longer time taken for transit because of the distances, high costs, which include sea freight costs and customs tariffs, and some complicated formalities with customs that cause changes in transit time and cost. In addition, the varied nature of regulatory and standard practices in different countries can hinder efficiency in the operations of a logistics company or business while posing potential risks for non-adherence to such rules and regulations [1]. Based

on these trends, the provisions of measures that would enhance the cross-border e-commerce logistics system appear tenable. This paper also aims to look at the current characteristics of cross-border e-commerce logistics, look at the problems that are prevalent, and then analyze what can be done to mitigate them. In this paper, the research questions, derived from the identified gaps in the literature, will be formulated as follows: This paper aims to identify the factors leading to inefficiencies and high costs in the analyzed logistics process. Additionally, it outlines the measures that can be implemented to eliminate these inefficiencies and reduce costs. With the help of these measures of optimization, businesses can achieve the goal of increasing the level of logistics' operational dependability and reliability, thus adding value to the customer's satisfaction and contributing to the sustainable growth of the cross-border eCommerce industry. This research is of significance in the current period. The global e-commerce market is growing with the rationale that efficient logistics form a key aspect of the success of any business venture in the global market.

2. Current State and Challenges of Cross-Border E-commerce Logistics

2.1. Current Characteristics and Forms of Cross-Border E-commerce Logistics

The overall map of cross-border e-commerce has unique features compared to a logistics map in supply chain logistics. One of the vital attributes is the international focus, which means that multiple international countries and regions need to be effectively managed. This includes hedging across different regulatory environments, managing through different customs, and coping with differing delivery norms. Moreover, international e-commerce logistical solutions frequently include the use of various means of transportation, i.e., air, sea, and ground transportation, in order to keep costs reasonable and to deliver goods as fast as possible [2]. Technology, including real-time tracking systems and automated warehouses, has also been established as an important factor that increases the levels of logistics transparency.

2.2. Analysis of Cross-Border E-commerce Logistics Development Trends

The X-Border e-commerce logistics sector has become the new frontier for the growth of cross-border commerce due to enhanced innovation in technologies and changing customer behavior. As the industry evolves, informed trends include self-employed routes through AI technology, secure transactions thanks to blockchain, and delivery through drones for the last mile of the process. In addition, there has been a recent push for sustainability, where many companies are seeking out recyclable products for packaging and are turning more towards carbon-neutral delivery services.

2.3. Key Players in Cross-Border E-commerce Logistics

Various sectors are involved in cross-border e-commerce logistics, including e-commerce companies, third-party logistics providers, customs brokers, and last-mile delivery carriers. Multinational and prominent online retail companies like Amazon and Alibaba have grown complex logistics systems to accommodate their international businesses. Purchasing agents, particularly those involved in the import and export of goods, can seek the assistance of logistics service providers like DHL, FedEx, and UPS to facilitate international transportation [3]. Customs agents are intermediaries that help the smooth conducting of the customs process, and last-mile delivery is the delivery of consignments to consumers.

2.4. Cross-Border E-commerce Logistics Models and Their Characteristics

There are various logistics models present in cross-border e-commerce, and each one has its own features. One of the modes of transport is direct delivery, where products are delivered directly from

the seller to the buyer. Another mode involves storage centers, which store products in strategic points near the markets. A third mode is drop shipments, where suppliers rely on agents to deliver the products. Each model has a certain amount of flexibility, cost, and time factors, thus impacting the extent and manner in which the logistics system is effective and efficient.

3. Problem Analysis

The Kangaroo Supply Chain Management (KSCM) cross-border e-commerce logistics organizing form confronts three important difficulties that challenge the applicability and performance of the supply chain. These challenges can have been termed as, challenges of timeliness, higher cost of logistics, and logistics information gap. To have a clearer view of these problems, this section seeks to explain each of them in detail, together with their effect on the cross-border e-commerce environment.

3.1. Causes of Low Logistics Timeliness

The last concern that is very crucial in cross-border e-commerce logistics is the timeliness of the deliveries. Customs procedures remain largely different around the world, and some might even take time to clear the goods. Products may require some steep scrutiny, and any variance from papers will take extra time to address. The lack of well-defined procedures on the matter also contributes to the issue, and an intervention by multiple agencies only complicates the matter. Transportation-related problems are very common in practically every part of the world, particularly in developing nations. Challenges in direct flights, sea routes, and efficient ground transport, particularly for cross-country shipments, mean that the delivery time is greatly affected [4]. Besides, such factors as weather conditions during the different seasons of the year make transport to and from the airport messy, further increasing the duration taken to travel.

Delays at strategic origins of movement, particularly near key transshipment facilities, for example, ports and airports, are frequent. Large quantities of traffic, low accommodative capacities, and slow transit at these nodes may lead to such congestion. These areas of weakness were brought to the forefront of the facade during the COVID-19 crisis, with many logistical hubs grappling with the increased demand and workforce issues. Cross-borders are complex processes involving manufacturers, freight forwarders, customs brokers, and last-mile delivery providers, all of whom are expected to work together to ensure efficiency [5]. This information indicates that failure of outbound, inbound, or horizontal communication between these parties can result in delays. For instance, a delay in customs clearance means an interruption of the supply chain, followed by transport interruptions and delays in delivery.

3.2. Factors Contributing to High Logistics Costs

Another significant problem in cross-border e-commerce is the relatively high cost that has to be spent on the delivery of products. These costs can make a huge dent in the revenues of e-commerce businesses and put a strain on the consumer price of products. Three factors contribute to these high costs.

Overseas shipping is generally more costly than domestic shipping because it entails a larger distance to be covered, and products will require other means of transport, such as railways, roads, etc., before reaching distant client's premises. Air freight is especially expensive, but it is frequently the only mode of transport that enables meeting the deadlines. Comparatively, the sea freight carries longer transit time, plus it also incurs additional costs like handling charges at the port. Taxes on goods for international purchases include customs duties, value-added taxes (VAT), and other import taxes, contributing heavily to the cost [6]. A number of these fees are standard across countries and

products and have different costs by product category, making costs hard to determine and highly volatile. Sometimes, businesses are forced to include these costs in their calculations to set prices for their commodities, which are often relatively high.

In export and import operations, the consignment needs protection in transit and through several phases of handling; that is why customized packaging is needed. The packaging used should be strong enough to withstand transportation shocks that may be characteristic of most international freight, leading to high material and labor costs. Further, an extra layer of cost is incurred due to the requirement of special shipment, especially for sensitive items that require being kept at a certain temperature.

3.3. Addressing the Issue of Logistics Information Asymmetry

Information inequality especially affects logistics information, thus representing a major challenge to effective cross-border e-commerce. Information invisibility can also occur when there is an unequal distribution of information across the various participants in a supply chain, which results in inefficiencies and mistakes. Some of the factors which have led to this development. This study identifies a series of obstacles, including the absence of visibility concerning the position of supplies in transit. If the appropriate information cannot be obtained, and partners do not update this information frequently enough, then businesses and consumers cannot monitor shipments efficiently [7]. This leads to issues such as ambiguity, misunderstanding between the client and supplier, and reduced customer satisfaction. For instance, various parties involved in the logistics chain employ diverse appliances and use different formats of data. Gaps in standardization of such systems thus produce elements of conflict when information exchange is carried out across different institutions. For instance, relevant systems that an original equipment manufacturer (OEM) deploys may be different from those of a freight forwarder; thus, data translation takes place, and information sharing experiences delays.

Two major identified challenges include traditional communication methods like emails and telephone calls, which are slow and can cause a communication breakdown. These strategies are ineffective in dealing with the global and fluid realities of global and fluid logistics. These miscommunications can include delays, not receiving new information, or parcels and shipments not being handled properly [8]. That is why information security has particular importance in cross-border logistics activities. Some of the challenges are the sharing of data, including shipping documents and payment information, that is exposed to cyber threats in the sharing process. This makes it vital to protect the data as they are crucial to build and retain trust amongst the supply chain partners as well as to increase efficiency.

For cross-border e-commerce logistics, there are three major issues, which are delaying logistics time, high logistics cost, and the problem of logistics information dissatisfaction. Solving these problems does not involve only increasing the efficiency of customs formalities, transport, and communication facilities and improving cooperation between the parties but also using technologies to solve problems related to the disclosure and visibility of information. Thus, addressing those issues helps both businesses reach better operational performance in terms of reliability, effectiveness, and costs, and e-commerce logistics grow as an essential segment of the global e-commerce market sustainably.

4. Optimization Suggestions

4.1. Strategies and Measures to Enhance Logistics Efficiency

The optimization of customs clearance can be considered one of the most significant missions in perspective of minimizing the corresponding times. There is also one more useful measure, namely

the use of the most high-technology electronic data interchange (EDI), which enables the delivery of shipping documents and customs declarations before actual shipment. This can also help to hasten the clearance time since the customs authorities will be able to review the documents and effects prior to products entering their country. Furthermore, participation in programs like the Authorized Economic Operator (AEO) can also be a boon to traders, as these programs lead to more streamlined and faster trade processes in front of customs.

Transport infrastructure emphasizes the necessity to invest in transportation infrastructure, particularly in the developing countries in this case. There is a possibility of cooperation with governments and private sectors, which will assist in the construction as well as the improvement of airports, seaports, and other roads. Furthermore, increasing the utilization of combined transport, which is the kind of transport that involves the operation of at least two modes of transport, can also be adopted [9]. A case in point is when sophisticated transportation equipment, such as delivery methods (by rail and truck), can determine better ways to shuttle consignments in the least time.

Integrating modern technology like Artificial Intelligence and Machine learning, as well as Internet of Things technology, can increase logistics efficiency. It is also valuable for optimizing the delivery path and knowing which route would be the one where delivery would be both quickest and least expensive. Internet of Things devices can allow tracking and monitoring of consignments in real-time; they can alert the shippers or transporters when problems develop during transportation.

4.2. Cost Reduction Optimization Plans

Some of the ways that can help a company minimize transportation expenses are presented below. Organizations can negotiate with carriers on the possible volumes of shipment and the corresponding rates for shipping. This way, rates for a large quantity of shipments are affordable and businesspeople can take advantage of the economy of scale. It will not only decrease the cost of shipping per unit but also greatly impact making the arrangement of logistics easier.

Minimizing packaging size and weight are two good reasons to grab the attention of key decision-makers since it means cost reduction is an option. There is a need for packagers to ensure that the packaging materials that they use offer protection to the goods and, at the same time, ensure that an excess use of these materials is not made. Standardization of the packaging dimensions can also enhance the ease of handling the products and in addition, enhancement of packaging dimensions will also reduce the dimensions charges levied by the carriers. Businesses running companies should use free trade agreements (FTAs) and preferential trade policies to avoid or reduce costs like customs duties and taxes. Companies reap the advantages of reduced tariff measures by understanding and fully adapting to rules of origin. This necessitates adequate FTA's knowledge of the requirement and the ability to furnish relevant documents to customs.

4.3. Recommendations for Optimizing Logistics Information Flow

Introducing the concept of relatively unified integrated digital solutions, the work process may be optimized and the information exchange between the enterprises accelerated. Such systems can simultaneously involve manufacturers, logistics companies, customs agencies, and buyer-consumers in an integrated environment for tracking and controlling the delivery of the cargo. The solutions in the cloud help in making data available in real time so that there is no doubt about the info shared by different departments.

Business documents such as contracts, invoices, and shipping records can be safely and openly stored on the Blockchain. The nature of blockchain means that there is a permanent record for all transactions, which can increase the credibility of shipping documents, limit the amount of fraud, and build more reliable relations between shipper and receiver. Its application in smart contracts on the

blockchain, the payment process, and customs declaration, for instance, also helps to optimize logistics even more [10]. It is critical to find common means of data exchange in order to enhance data management or, in other words, to use a common format or protocol. Some of the EPCIS standards that have been developed for the industry to use include the Electronic Product Code Information Services (EPCIS), which brings about compatibility and interconnectivity. Cleansing the format decreases the likelihood of a translation error and enables efficient data exchange.

5. Conclusion

Therefore, it can be stated that the enhancement of the logistics system factors is crucial for cross-border e-commerce to create better conditions toward efficiency, minimizing costs, and providing the best experience to customers. The issues of low timeliness, high cost, and information dysfunction are important barriers that hinder the realization of these gains. Through the improvement of the customs clearance procedures, optimization of transport and transit infrastructure, as well as leveraging artificial intelligence and the conceptualization of the Internet of Things, enterprises can contribute to the extended effectiveness of their supply chain management.

Moreover, increasing shipping costs, finding cheaper packaging options, buying goods in bulk, and taking advantage of FTA could contribute to lowering costs and helping cross-border e-commerce become more competitive. Introducing and optimizing combinations of transportation modes and improving mobility coordination between the actors may also help to balance cost and time and provide customers with more efficient and cheap transport.

Optimization of the means of shipment is also another crucial aspect of logistics improvement that can be named. Specific solutions will include the establishment of linkages between digital platforms, the implementation of blockchain technology, the work on technical standards and common data format, and the strengthening of cybersecurity measures will help to overcome the problem of information asymmetry and support the full provision of all the relevant information to stakeholders. The implementation of such transparency and reliability is important for obtaining trust and optimized operationalization in the key network of logistics.

To implement these strategies and measures, it is necessary to form strategic partnerships with other stakeholders in the logistics supply chain, such as LSPs and customs offices, as well as technology partners. Such cooperation can help adopt sophisticated technologies that are crucial to the proper operations of the logistics working system.

In conclusion, it can be highlighted that the problem of improving cross-border e-commerce logistics is crucial, and an effective solution will contribute not only to the development of the industry but also to the provision of a high level of consumer satisfaction. The conclusions provide information that businesses, authorities, supply chain academics, and supply chain managers can use to address challenges and leverage opportunities for e-commerce across the global market. In addition, this study adds to the currently available knowledge of SCM in the fields of cross-border trading.

Of course, it is necessary to indicate certain obvious drawbacks of this study. The research mainly concerns the situation in cross-border e-commerce logistics and only provides recommendations for its future development. Future research could further focus on the logistics and delivery efficiency of particular intermediaries in the context of emerging technologies such as blockchain and AI or the efficiency and potential of government initiatives to foster cross-border trade. However, this work could have been complemented by empirical investigations to confirm the efficiency of the proposed optimization measures for improving supply chain performance, thereby adding to the practical relevance of the research findings.

References

- [1] Rachana Harish, A., Liu, X., Zhong, R. et al. (2020). *Log-Flock: A Blockchain-enabled Platform for Digital Asset Valuation and Risk Assessment in E-commerce Logistics Financing*. *Computers & Industrial Engineering*.
- [2] Chen, X. (2019). *Marine Transport Efficiency Evaluation of Cross-border E-commerce Logistics Based on Analytic Hierarchy Process*. *Journal of Coastal Research*, 4, 62-69.
- [3] Zhang, S., Wang, H., Huang, M. (2016). *Research of E-commerce Logistics Based on the Network Information Era*.
- [4] Mahindru, R. (2014). *E-commerce and Logistics*. *Asian Journal of Marketing & Management Research*, 6, 45-56.
- [5] Weltevreden, J.W.J. (2008). *B2C E-commerce Logistics: the Rise of Collection-and-delivery Points in the Netherlands*. *International Journal of Retail & Distribution Management*, 36(8-9), 638-660.
- [6] Chang, H.T.S. (2010). *An Innovative Automated Storage and Retrieval System for B2C E-commerce Logistics*. *The International Journal of Advanced Manufacturing Technology*, 2, 200-221.
- [7] Hou, F.X. (2014). *Analysis on the Situation of China's E-Commerce Logistics*. *Advanced Materials Research*, 3, 78-89.
- [8] Liu, X., Chen, D., Cai, J. (2015). *The Operation of the Cross-Border E-commerce Logistics in China*.
- [9] Wei, Q., Sun, D., Gou, X., et al. (2021). *Sharing Economy for Cost Reduction and Efficiency Increase: The Case of Sharing E-Commerce Logistics*.
- [10] Wang, X., Pan, Y., et al. (2009). *Integration of RFID Technique and E-Commerce Logistics*. 9, 345-356.