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Abstract. With the development of economic globalization and the proposal of the "One Belt, One Road" policy, cross-border e-commerce has ushered in development opportunities and developed rapidly. However, the lag of cross-border logistics service level and high logistics cost hinder the further development of cross-border e-commerce and become a bottleneck for the development of cross-border e-commerce enterprises. Therefore, in order to improve the cross-border e-commerce logistics level, cross-border e-commerce enterprises need to make reasonable choices about logistics mode to achieve the effect of reducing costs, improving service level and customer satisfaction. This paper divides the current cross-border logistics mode into express parcels and overseas warehousing and introduces them separately. It analyzes the macro influencing factors and micro influencing factors of the choice of logistics mode. By constructing the profit maximization function, it makes a selection of logistics modes and further studies the decision of self-operating or outsourcing in overseas warehouses. Finally, the corresponding suggestions are put forward according to the actual problems.

1. Introduction
With the development of global economic integration, the foreign trade industry has developed rapidly. Exports, as one of the “troikas” that drive the national economy, have maintained a steady growth trend. According to the data of the National Bureau of Statistics, it can be seen that the growth rate of imports and exports in recent years has been relatively flat. The establishment of free trade zone and the implementation of the “One Belt, One Road” development strategy play an important role in promoting the growth of bilateral trade volume between China and countries along the route. It can effectively allocate resources along the countries and regions along the line to achieve win-win cooperation and bring us unprecedented opportunities for development[1]. Despite the recent Sino-US trade war, China's foreign trade market is in a severe situation and the export growth rate has declined. However, under the general trend of economic globalization, China's export trade still has a good development trend.

With the popularity of smartphones and the Internet, cross-border e-commerce has emerged and developed rapidly. According to data from the China E-Commerce Research Center, in the first half of 2018, China's cross-border e-commerce transactions were 4.5 trillion yuan, a year-on-year increase of 25%, and the scale of cross-border e-commerce transactions for exports was 3.47 trillion yuan, a year-on-year increase of 26%. In the model structure, B2B transactions were the mainstay, accounting for 84.6% of the total, and the revenue scale was 25.5 billion yuan, a year-on-year increase of 51.7%. The B2C model has maintained a relatively high growth rate and has a huge development space. More and more retailers are taking advantage of current development opportunities to connect overseas buyers with cross-border e-commerce platforms, breaking the trading channels under the traditional mode, and thus achieving higher economic benefits. Although the current cross-border e-commerce development momentum is good, the current level of cross-border logistics has become an important
factor restricting the development of cross-border exports. The cost, timeliness and delivery rate of logistics play an important role in influencing consumers’ willingness to consume and satisfaction. Therefore, choosing the right cross-border logistics model is crucial for the development of the foreign trade industry and the cross-border e-commerce industry. The logistics mode in this paper refers to the general term for transportation, warehousing, distribution and other operations experienced by products from domestic sellers to foreign buyers. Different logistics modes are applicable to different products, and the appropriate logistics mode can achieve the effects of reducing costs, improving timeliness, and improving the satisfaction of buyers and sellers. The current major cross-border logistics modes include international postal parcels, four international express delivery, international services for domestic express delivery, and overseas warehousing mode. Cross-border logistics has become a key support link for cross-border e-commerce development. Choosing the right cross-border logistics mode is the guarantee for the sustained and stable development of cross-border e-commerce.

2. B2C Cross-border E-commerce Logistics Modes

China's existing B2C cross-border e-commerce logistics mode mainly includes postal parcels, four international express delivery, international services for domestic express delivery, and overseas warehousing. According to the research of Cao and Meng, these logistics modes can be summarized into two categories: express parcels and overseas warehousing.

2.1. Express parcel

Express parcel refers to the logistics mode of cross-border e-commerce to send goods to foreign buyers through postal or international express. This is the most important logistics mode used by B2C cross-border e-commerce sellers in China. Among them, the postal parcel is the most popular. It can cover most countries and regions and the price is lower than other logistics modes. However, it has strict requirements on the weight and volume of the goods, and the delivery time of the goods is long, generally 10-20 days, and the packet loss rate is high, and it is impossible to track all the logistics information in real time. In short, the service level is low. The international express delivery has a long development time. It has a complete international logistics network and high-end international logistics operation level. In the cross-border logistics business, it has the characteristics of short timeliness, high speed, high security, strong customs clearance ability, etc. However, the cost of international express delivery is relatively high. In remote areas, it is also necessary to pay surcharges. The goods exported by cross-border e-commerce in China are mostly low-value products and cannot bear high freight rates, so the international express delivery is less used than postal parcel.

2.2. Overseas warehousing mode

The overseas warehousing mode refers to the cross-border e-commerce export sellers to conduct data analysis and demand forecast based on past sales data, and transport the goods to foreign warehouses in advance by sea, air or express. When the customer places an order on the Internet platform, the goods are shipped from the foreign warehouse to the customer. Overseas warehousing is generally divided into three parts: head-end transportation, warehousing management and tail-end delivery. The first-class transportation refers to the process of goods being shipped from domestic sellers by sea, air, express or intermodal to foreign warehouses. Warehousing management refers to a series of management activities of goods in overseas warehouses, including the operation of goods in and out of the warehouse, packaging, sorting, etc. The tail delivery refers to the process of using local express or postal parcels to deliver goods from overseas warehouses to buyers. Overseas warehousing is a major milestone in the development of cross-border logistics. It is of great significance to the development of cross-border e-commerce and cross-border logistics. It is not limited by the volume and weight, and can reduce costs through the scale effect of head-end transportation. Shipment locally also gives it a great advantage in terms of timeliness. However, the use of overseas warehouses requires sellers to make accurate predictions of sales trends, and requires hot-selling products with fast turnover to be placed in overseas warehouses. If the goods are not sold for too long, the storage costs are too high.
The current cross-border e-commerce development trend is pretty good. Many cross-border e-commerce companies are optimistic about the development prospects of overseas warehousing. They regard it as a new trend of expanding overseas business, and they have invested in building overseas warehouses. However, the pre-construction cost of overseas warehouses is too high, and it requires a lot of capital and manpower. Therefore, some cross-border e-commerce sellers, especially small and medium-sized sellers, choose to use the overseas warehouses of third-party logistics companies.

3. Factors affecting the choice of B2C cross-border logistics mode

This paper refers to the research methods of Mao Lijuan et al., and divides the influencing factors of B2C cross-border e-commerce export logistics model into macro factors and micro factors.

3.1. Macro factors

The political, economic and social environment of cross-border exporting countries have an important impact on the choice of cross-border e-commerce export logistics mode. Political and social stability are important conditions for ensuring the smooth delivery of goods to buyers. For example, this year’s large-scale strike of Canadian postal workers has had a huge impact on cross-border e-commerce companies. The strike lasted from October 22, 2018 to the end of November 2018, which lasted for more than a month. Canada Post has a large backlog of packages. When cross-border e-commerce companies export products to Canada during this time, they need to fully consider the impact of the strike and try to avoid Canada Post when choosing cross-border logistics channels. At the same time, economic development is also a necessary condition for promoting the development of cross-border logistics. Driven by economic development, the Internet and mobile phones, computers and other communication equipment have been popularized. In addition, countries with better economic levels have perfect logistics facilities and a stable supply chain network, which is the basis for ensuring the stable development of cross-border logistics. It is of great significance to the development of cross-border logistics.

3.2. Micro factors

3.2.1. Product attributes. The attributes of the product itself affect the selection of logistics models for cross-border e-commerce. For example, high-value products or fragile products require a safer logistics method, and postal parcels have strict restrictions on the volume and weight of single-piece goods. Some products require high timeliness, and you need to choose international express delivery with fast-responding or store the goods in overseas warehouses in advance. Liquid, charged products and powders need to be transported by special logistics mode.

3.2.2. Logistics costs. Logistics costs are an important factor in the selection of logistics modes for cross-border e-commerce, including all costs incurred in the process of delivering goods from domestic sellers to foreign buyers. Logistics costs are an important factor in the selection of logistics modes for cross-border e-commerce, including all costs incurred in the process of delivering goods from domestic sellers to foreign buyers. Cross-border e-commerce companies have also been working to reduce the cost of cross-border logistics to enhance their competitiveness and occupy a larger market share.

3.2.3. Timeliness. Foreign buyers are paying more and more attention to the timeliness of delivery of goods, which directly affects customer satisfaction with logistics services and thus affects the satisfaction of cross-border e-commerce sellers. Different logistics modes have different timeliness. For example, overseas warehousing mode can be shipped locally, so the delivery time is shorter, and the postal packet takes longer time.
### 3.2.4. Security

Security includes the damage rate, loss rate, accuracy rate of the goods during transportation. The postal packet has a high packet loss rate and cannot track logistics information, thus the security is low. International express delivery relies on its own powerful logistics network and advanced logistics equipment to accurately monitor the status of the goods, and the security is relatively high. Overseas warehousing can be shipped using local logistics, with relatively low risk.

### 4. Theoretical Model for B2C Cross-border E-commerce Export Logistics Mode Selection

According to the above, the cross-border e-commerce export logistics mode is divided into express parcels and overseas warehousing, while overseas warehousing is divided into two modes: self-built and outsourced. This paper selects the export logistics mode by constructing the profit function of the enterprise.

#### 4.1. Express parcels and overseas warehousing mode

The principle of B2C cross-border e-commerce companies choosing a cross-border logistics mode is to minimize costs. The overseas warehousing mode can increase the customer's demand compared with the express parcel, but the pre-construction cost of self-built overseas warehouses and the cost of renting out overseas warehouses are higher. This paper uses the method of Tan Fangfang to select the logistics mode with maximum profit.

This paper proposes the following assumptions:

1. Hypothesis 1: The express parcel has only an outsourcing mode, and all products can be delivered to the customer through express parcels and overseas warehousing mode.
2. Hypothesis 2: Overseas warehousing mode have a positive effect on commodity sales. As the market conditions improved, cross-border e-commerce will choose to use the overseas warehousing mode at a certain time.
3. Hypothesis 3: Consumer demand increases steadily over time $t$.
4. Hypothesis 4: The overseas warehousing mode has higher operating costs than the express parcel.

According to the assumption, when the express parcel is only selected, the consumer demand function is $D(t)=\lambda t$. When the cross-border e-commerce chooses to use the overseas warehousing mode at time $t_1$, the consumer demand is $D'(t)=\lambda' t$, where $\lambda' > \lambda$. When the cross-border e-commerce company chooses to use the express parcel, the profit per unit commodity is $\pi$, the pre-investment cost when using the overseas warehouse is $c_0$, and the operating cost per unit product of the overseas warehouse is $c'$. $e^{-rt}$ is the discount rate of the currency unit. The maximization function of long-term discounted profits of cross-border e-commerce companies is:

$$\max_T R = \int_0^\infty e^{-rt} [\pi \times D(t)] dt - c_0 e^{-rT} + \int_T^{+\infty} e^{-rt} [\pi - c'] \times D'(t) dt$$

(1)

Deriving (1) and making the first derivative equal to 0, simplifying:

$$r c_0 + [(\lambda - \lambda')\pi + \lambda' c'] T = 0$$

(2)

It can be known from (2) that when $(\lambda - \lambda')\pi + \lambda' c' \geq 0$, the maximum value of (1) is obtained when $T = +\infty$, that is, cross-border e-commerce companies have always used express parcels. When $(\lambda - \lambda')\pi + \lambda' c' < 0$, the second derivative of the formula (1) is smaller than 0, that is, the equation (1) has a maximum value. Organized by (2):

$$T = \frac{r c_0}{(\lambda' - \lambda)\pi - \lambda' c'}$$

(3)

From (3), the following conclusions can be drawn:

1. The larger the $\pi$, the smaller the $T$, that is, the higher the profit of the unit commodity, the sooner the overseas warehouse can be used to obtain the maximum profit;
2. The larger the $\lambda'$, the smaller the $T$, that is, the greater the consumer demand, the sooner the enterprise needs to use the overseas warehouse;
3. The larger the $c_0$ and $c'$, the larger the $T$, that is, the higher the initial investment cost of the overseas warehouse and the operating cost per unit of goods, the later the cross-border e-commerce enterprise will use the overseas warehouse.
In summary, the higher the profit of the product, the larger the sales volume, and the use of overseas warehouses can bring greater profits. This is because the inventory turnover rate of products with large demand in overseas warehouses is relatively high, and the initial construction cost and operating cost of overseas warehouses will be reduced after each product is allocated. Therefore, the development of overseas warehouse business can obtain more profit.

4.2. Selection of overseas warehousing modes

Overseas warehousing are divided into two modes: self-built and outsourced. Since the construction of overseas warehouses requires a large amount of capital, the general small and medium-sized cross-border e-commerce companies cannot afford them, so they generally choose to use the overseas warehouse business of third-party logistics companies. This paper chooses the overseas warehousing mode by constructing the profit function of the overseas warehouse self-employment and outsourcing models.

The initial investment cost of outsourcing overseas warehouses is 0, but it is necessary to pay the expenses such as warehouse rent, and the cost of this part of the operating costs to each product is \( c_1 \). The initial investment cost of self-built overseas warehouses is \( c_0 \), and the operating costs incurred in managing overseas warehouses are spread to each product at a cost of \( c_2 \).

This paper proposes the following assumptions:

Hypothesis 5: The profit per unit of commodity is \( \pi \), and \( c_1, c_2 < \pi \).

Hypothesis 6: Cross-border e-commerce companies only sell one product. When choosing to outsource overseas warehouses, consumers' demand for goods is \( D_1 = a - bp \), where \( p \) is the commodity price and \( b \) is the price elasticity coefficient.

Hypothesis 7: When choosing to build an overseas warehouse, the consumer's demand for the commodity is \( D_2 = a - bp + d \varepsilon \). Among them, \( \varepsilon = |c_1 - c_2| \) is the elasticity coefficient between the operating costs of self-built and outsourced overseas warehouses, and \( d \) is the elasticity coefficient of consumers' savings on operating costs. When \( c_1 - c_2 > 0, d > 0 \), at this time \( D_2 > D_1 \), the demand for self-built overseas warehouses is larger; when \( c_1 - c_2 < 0, d < 0 \), at this time \( D_2 < D_1 \), the demand for outsourcing overseas warehouses is larger.

The profit when the enterprise chooses overseas warehouse outsourcing is:

\[
R_1 = (a - bp)(\pi - c_1) \tag{4}
\]

The profit when the enterprise chooses to build its own overseas warehouse is:

\[
R_2 = (a - bp + d \varepsilon)(\pi - c_2) - c_0 \tag{5}
\]

The \( \pi \) in (4) and (5) is the unit profit of the commodity. When \( R_1 - R_2 > 0 \), the enterprise chooses the overseas warehouse outsourcing to obtain greater profit, then the conditions for the enterprise to choose the outsourcing model are as follows:

\[
(a - bp)(c_2 - c_1) + d \varepsilon(c_2 - \pi) + c_0 > 0 \tag{6}
\]

It can be obtained by the analysis of (6):

① When \( c_2 - c_1 > 0, d < 0 \), (6) is established. That is, when the operating cost of the unit commodity of the self-built overseas warehouse is higher than the outsourcing, the enterprise needs to select the overseas warehouse outsourcing business;

② When \( c_2 - c_1 < 0, d > 0 \). And then when \( c_0 > (c_1 - c_2)[a - bp + d(\pi - c_2)] \), the overseas warehouse business of the third-party logistics enterprise should be selected. That is, when the operating cost of the self-built overseas warehouse is lower than the outsourcing, the initial construction cost of the self-built overseas warehouse, the difference between the unit operating cost of the overseas warehouse self-construction and outsourcing, and the profit per unit of product will all affect the enterprise's overseas warehousing mode selection.

According to the above analysis, cross-border e-commerce companies are affected by the operating costs of overseas warehouses when they choose the overseas warehousing mode. The operating cost of self-built overseas warehouses generally comes from the management costs of overseas warehouses, such as the salary of overseas warehouse staff and the maintenance of storage equipment. The operating cost of outsourcing overseas warehouses generally comes from storage expenses. Therefore,
inventory turnover rate is the key to reducing the operating costs of overseas warehouses. Enterprises can improve inventory turnover rate by selecting best-selling products, making demand forecasts, and selecting reasonable ordering strategies.

5. Conclusion
With the proposal of the "One Belt, One Road", China's cross-border e-commerce development momentum is good, but cross-border logistics is still the most critical factor hindering the development of cross-border e-commerce. This paper studies the cross-border logistics mode selection by constructing the profit maximization function of cross-border e-commerce enterprises. However, there are still many problems that are difficult to deal with in the real situation. In response to these problems, the following suggestions are proposed:

Firstly, the government needs to introduce policies to promote cross-border logistics development, strengthen supervision of cross-border logistics, and improve the cross-border logistics service standard system to enable cross-border logistics and cross-border e-commerce to develop synergistically. Secondly, cross-border e-commerce companies need to recognize their own positioning, fully consider their own situation when choosing the cross-border logistics mode. SMEs have insufficient funds in the early stage of development, and the products have not yet opened the market. They can choose express parcels for the distribution of goods. As the company grows stronger and stronger, the sales volume of products rises. At this time, the company can choose the overseas warehouse business of third-party cross-border logistics to reduce the logistics cost and promote product sales. After the company has certain funds and strengths, it can choose to build its own overseas warehouses in order to better control the logistics process and improve the logistics service level and customer satisfaction. Cross-border e-commerce company needs to do a good job of demand forecasting and warehousing management when selecting overseas warehouse business, which plays an important role in reducing the logistics cost of enterprises. Thirdly, the current cross-border logistics enterprises have limited service levels, and the problems of untimely information tracking and high costs are more prominent. In order to solve these problems, various cross-border logistics enterprises can cooperate with each other to establish a logistics facility equipment sharing mechanism[5] to improve utilization. At the same time, cross-border e-commerce companies and industry associations can jointly formulate industry norms and logistics standards in accordance with national policies and international logistics standards, and actively seek cooperation with foreign local logistics companies to expand the scope of services, thus making the connection with international logistics smoother.

References
[1] Bin Hou, Ma Quancheng, Wang Huanfang, Zhang Weikang. Analysis of China's cross-border e-commerce overseas warehouse model under the “Belt and Road” [J]. Logistics Technology, 2018, 41 (05): 128-131.
[2] Cao Shuyan, Li Zhenxin Research on third-party logistics model of cross-border e-commerce [J] E-commerce, 2013 (03): 23-25.
[3] Meng Ling, Zhang Baoming. The development of the logistics industry under the cross-border e-commerce environment [J]. Logistics Engineering and Management, 2014, 36(11): 110-113. More references
[4] Qin Xinsheng. Rationalization of overseas warehousing costs for cross-border e-commerce enterprises [J]. Foreign Trade, 2017 (08): 38-40.
[5] Mao Lijuan AHP-based small cross-border e-commerce export trade logistics mode selection application analysis [J] Business Economics Research, 2018 (09): 115-117.
[6] Tan Fangfang, Jin Xiaqing. Economic Analysis of B2C Type Logistics Distribution Mode in China at Present Stage: Taking B2C Online Book City as an Example [J]. Southern Economy, 2006 (1): 39-47.