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Retraction

Retracted: Overseas Warehouse Location of Cross-Border E-Commerce Based on Particle Swarm Optimization

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] X. Ji, "Overseas Warehouse Location of Cross-Border E-Commerce Based on Particle Swarm Optimization," *Journal of Control Science and Engineering*, vol. 2022, Article ID 9734633, 6 pages, 2022.

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Research Article

Overseas Warehouse Location of Cross-Border E-Commerce Based on Particle Swarm Optimization

Xinnan Ji

Zhejiang Industry Polytechnic College, Shaoxing, Zhejiang 312000, China

Correspondence should be addressed to Xinnan Ji; 1522020206@st.usst.edu.cn

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In order to solve the problem of cross-border e-commerce warehouses as transit stations and direct selling platforms, the location of a cross-border e-commerce overseas warehouse is deeply studied on the basis of particle swarm optimization. Firstly, it studies the principle of algorithm optimization and algorithm method of particle swarm optimization. Among them, the self-built overseas warehouse mode has high requirements on the construction threshold, which is suitable for large cross-border e-commerce enterprises. The overseas warehouse model is built by a professional third party, which is economical and flexible, so it is suitable for mass cross-border e-commerce enterprises. Another overseas warehouse model is to build a cross-border logistics one-stop service platform with overseas warehouse as the core for all kinds of cross-border e-commerce enterprises, which is the development direction of overseas warehouse in the future. However, due to the immature construction conditions and too strong resource integration, this model is still in the stage of research, exploration, and attempt. However, choosing the location of an overseas warehouse and how to use the particle swarm optimization algorithm in the overseas warehouse development experiment remain problems to be solved. After experiments and research, the particle swarm optimization algorithm is used to solve the problem in the context of cross-border e-commerce, which verifies the feasibility of the model, so as to give a specific scheme for the location of overseas hub warehouses and overseas warehouses.

1. Introduction

Particle swarm optimization algorithm is an optimization algorithm proposed in 1995. Because it is easy to understand and realize, it has been successfully applied in many optimization problems. In many cases, optimization problems in scientific practice scientific practice, engineering system design, social production, and economic development are multi-objective optimization problems such as production process control, software and hardware system design, and social and economic benefit analysis. Therefore, it is of great significance to study the multi-objective optimization problem. Since there is no unique global optimal solution for the multi-objective optimization problem, solving the multi-objective optimization problem is actually to find a set of solutions (Pareto optimal solution set). Figure 1 shows the flow chart of the modeling and identification process. The traditional multi-objective optimization method transforms the multi-objective problem into a single objective problem through weighted summation. However, this method requires a strong a priori understanding of the problem itself, which is difficult to deal with the real multi-objective problem. Because evolutionary computing is a computing technology based on population operation, it can implicitly search multiple solutions in the solution space in parallel and can use the similarity between different solutions to improve the efficiency of the concurrent solutions. Therefore, evolutionary computing is more suitable for solving multi-objective optimization problems. For the first time, evolutionary algorithm was used to study multi-objective optimization problems. The "vector evaluation genetic algorithm" was proposed. After that, many evolutionary algorithms for solving multi-objective optimization problems were proposed and successfully applied to multi-objective optimization problems. According to the data released by the National Bureau of Statistics, the total import

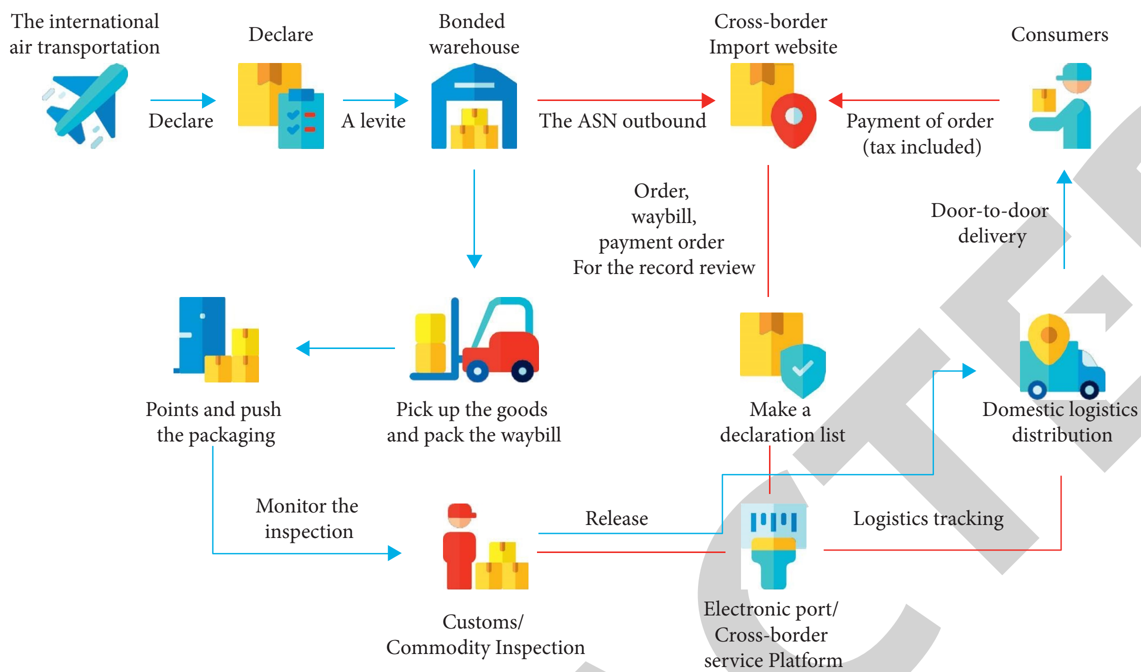

Figure 1: Modeling and identification process.

and export volume in 2014 reached 26400 billion yuan, of which the trade volume completed through cross-border e-commerce was about 400 billion yuan. However, with the rapid development of cross-border e-commerce and the increasingly stringent requirements of consumers for overseas Amoy business experience, the bottleneck of export logistics development has become increasingly prominent. In order to realize the localization of cross-border trade and improve consumers' shopping experience, many cross-border e-commerce have opened up overseas warehouse businesses.

2. Literature Review

Au et al. considered the main factors affecting the location of the logistics distribution center and established an analytic hierarchy process model to analyze the importance of each factor. Because it is easy to understand and realize, it has been successfully applied in many optimization problems, and in many cases, many optimization problems in scientific practice, engineering system design, social production, and economic development are multi-objective optimization problems [1]. Yuan et al. proposed using the fuzzy comprehensive evaluation method to determine the influencing factors of logistics distribution center location in e-commerce environment and provide solutions. The methods of quantitative research on warehouse location mainly include the Baumol Wolfe method, Kuehn hamburger method, CFLP, the center of gravity method, mixed integer programming method, and branch and bound method [2]. Bian et al. said that sun established a bilevel programming model with minimum planning personnel cost and minimum customer cost to seek the optimal location of the logistics distribution center; Rath and others solved the location problem by establishing MILP with heuristic constraints [3]. Sennan et al. proposed an adaptive particle swarm optimization algorithm with nonlinear weight and time-varying acceleration coefficient to solve the location problem. Using the particle swarm optimization algorithm, they constructed the location models of self-built overseas warehouses and third-party overseas warehouses respectively. They selected two enterprises to adopt different overseas warehouse models and build overseas warehouses in Europe for empirical analysis [4]. Chan et al. proposed using the particle swarm optimization algorithm to locate multiple distribution centers [5]. Zanganeh proposed a solution to the location problem of the secondary warehouse based on GIS and mutation particle swarm optimization algorithm. Different locations of overseas warehouses will lead to different logistics costs and customer experience, which has a significant impact on the development of cross-border e-commerce businesses [6]. Zhou et al. asked to establish a double objective model through integer programming, use particle swarm optimization algorithm to conduct quantitative research on overseas warehouse locations, analyze the actual factors to be considered in overseas warehouse locations through actual cases, and analyze the impact of various factors on the location problem [7]. Ding and Gu put forward that the biggest advantage of the overseas warehouses is that they can shorten the delivery time and ensure the quality of goods, so as to improve the recognition by local consumers of cross-border products and finally realize the formation of the core competitiveness of cross-border e-commerce enterprises. The advantages are that the overseas warehouse can improve the efficiency of cross-border logistics, simplify the transportation process, and intelligently distribute, package, and transport according to the shopping needs of consumers, which greatly shortens the logistics transportation time [8]. Yuan et al. said that due to the regular promotion activities of e-commerce in various countries, especially when major festivals are coming, the logistics industry will face a huge delivery test. The backlog of goods and the lag of speed will cause not only a decline in consumers' shopping experience but also a certain proportion of losses in commodity transportation [9]. Liu et al. said that the construction of an overseas warehouse can be based on the sales forecast of the same period and then prepare enough goods in advance, which can effectively avoid all stages of cross-border logistics peak. Finally, the establishment of overseas warehouses can also reduce logistics costs [10].

3. Method

3.1. Model Assumptions. The assumptions are as follows: ① From the domestic hub warehouse to the overseas warehouse, the shipping mode is adopted, and the freight rate discount is enjoyed $\theta(0 \le \theta \le 1)$. ② There is only one domestic hub warehouse and one overseas warehouse between domestic sellers and foreign buyers and domestic hub warehouses, overseas warehouses, and foreign buyers cannot be directly connected. ③ The construction cost of each node warehouse remains unchanged in the cycle. ④ The traffic volume will not exceed the capacity of each node warehouse. ⑤ The port city is selected as the address of domestic hub warehouse and overseas warehouse. The transportation distance from domestic hub warehouse to port and from port to overseas warehouse is far less than the shipping distance from domestic hub warehouse to overseas warehouse, which is ignored. ⑥ Distance, rate and traffic volume between nodes [11]. The generalization ability of the algorithm will affect the accuracy of network traffic prediction. Then,

$$V_i^d = W v_i^{d-1} + c_1 r_1 \left(pbest_i^d - x_i^d \right) + c_2 r_2 \left(gbest^d - x_i^d \right). \quad (1)$$

Among them, C_1 and C_2 are the individual learning factors of particles, V_i^d is the speed of the i-th particle in the d-th iteration, X_i^d is the position of the i-th particle in the d-th iteration, $pbest_i^d$ is the best position of the i-th particle up to the d-th iteration, and $gbest^d$ is the best position of all particles up to the d-th iteration. The model diagram of the particle algorithm is shown in Figure 2 [12].

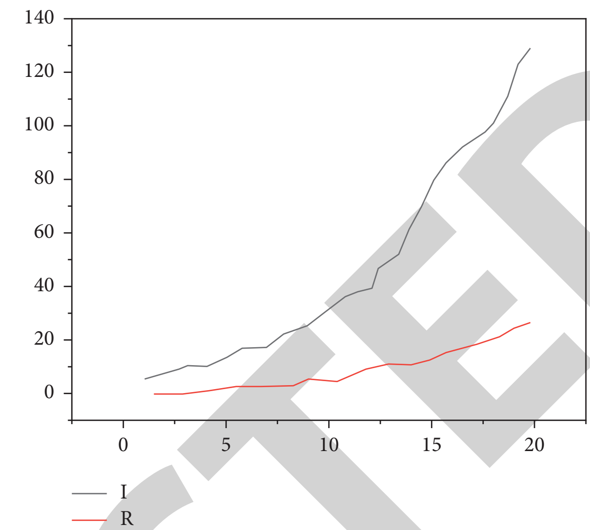

Figure 2: Particle swarm optimization model.

3.2. Support Vector Machine Method. When using a support vector machine to predict network traffic, there are problems of large regression field and inaccurate prediction, that is, support vector machine regression [13]. In this regard, in the nonlinear environment, the support vector machine function is used for fitting. When fitting, the linear regression function $f(x) = w \cdot x + b$ is used as the input and the output, that is, it is necessary to determine ω and b. When using a support vector machine for network traffic prediction, its penalty function is an important factor affecting the prediction result and an important concept in support vector machines [14]. The existing methods often need to select the function before optimizing the model and select

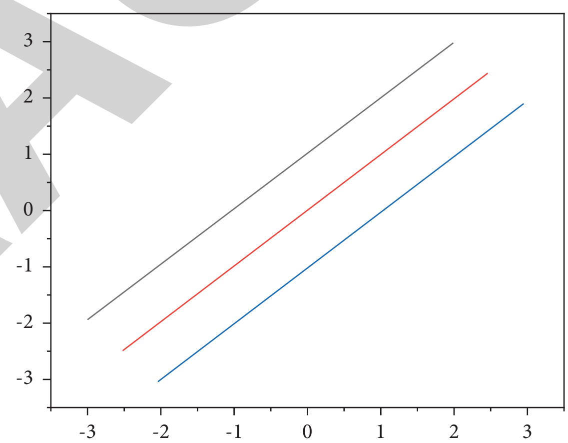

Figure 3: Characteristic value variation curve of support vector machine.

different loss functions for different optimization problems. Therefore, even the loss function of the same optimization problem will form a different model [15]. The generalizing ability of the algorithm will affect the prediction accuracy of network traffic. Therefore, an average value is selected as the penalty factor between the complexity of the support vector machine and misclassification samples to enhance the generalization of the algorithm. When flowing through the network input layer, if the penalty factor is too small, the penalty of exceeding the sample is small, the sample training error is large, the generalization ability is low, and the error prediction rate is high. On the contrary, if the penalty factor is too large, the learning accuracy of the algorithm is low and the generalization ability is not high [16]. Therefore, the most suitable penalty factor for the optimization model should be selected to ensure the stability and efficiency of network traffic prediction [17]. The structure diagram of the support vector machine is shown in Figure 3.

It can be seen from Figure 3 that during the operation of the support vector machine, the kernel function needs to be selected to map the nonlinear input value to the high-dimensional feature space, and the kernel function should meet its theorem characteristics [18].

3.3. Logistics Information Technology. Overseas warehouses have very high requirements for logistics information technology. Because the goods need to be transported to the overseas warehouse for storage in advance, the enterprise must operate remotely through the overseas warehouse management system. With the growth of physical technology, the demand for overseas warehouses is gradually increasing, as shown in Figure 4 [19]. At present, when the domestic logistics information technology is relatively backward, it is still relatively difficult. Because of the problem of detention, the goods stored in overseas warehouses must be sold well and have a high turnover rate; otherwise, they are likely to burst. It is also because a large part of the profits of overseas warehouses come from the rapid flow of goods. Regardless of the foreign market, overseas warehouses are bound to encounter legal risks [20]. For the local government, any warehouse should be opened by local entity enterprises, not a warehouse. Delivery is trading, and trading must be taxed. If the local tax invoice cannot be provided to the end customer, it will be considered a suspect of tax evasion [21]. The trend of the overseas location of the cross-border e-commerce industry is shown in Figure 5. Warehouse building requires its technology and supply chain management talents. Unless it is a developed country such as the United States, some emerging countries have underdeveloped logistics and warehousing, it is difficult to recruit corresponding talents. Even in developed countries, the labor cost itself is very high, which will increase the operation cost of overseas warehouses in any aspect [22]. The operation of overseas warehouses requires the employment of local people, so it is necessary to know and understand the local labor law. At the same time, the logistics is convenient, and the goods are often destroyed, for which local people are needed to handle environmental protection and other matters [23].

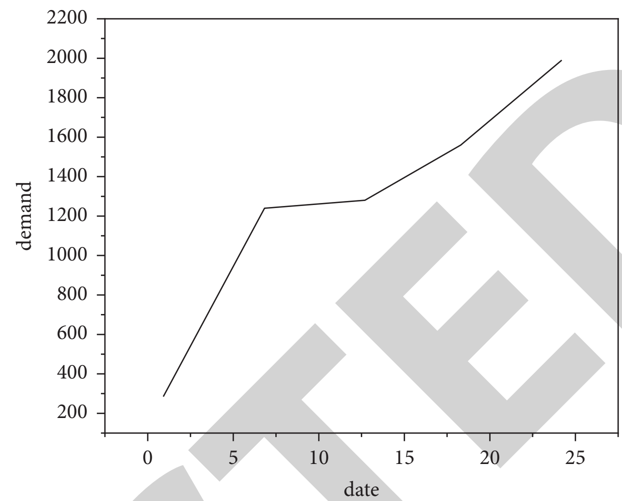

Figure 4: Overseas warehouse supply demand.

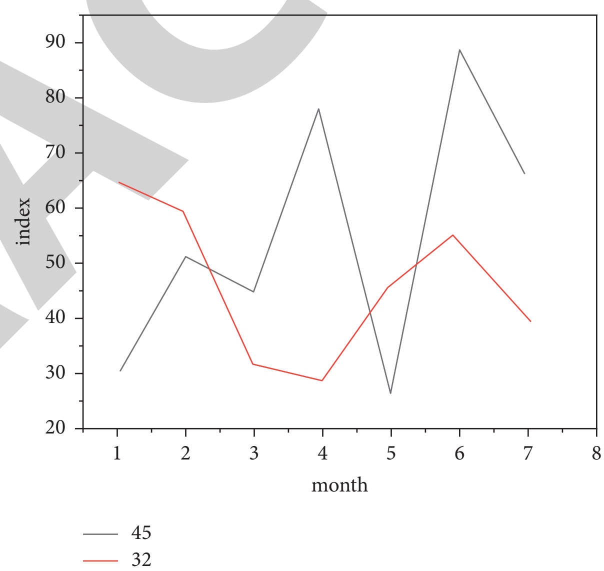

Figure 5: Overseas location trend of cross-border e-commerce industry.

4. Results and Analysis

Due to the large fluctuation of import and export trade volume and many influencing factors, it is difficult for the general prediction algorithm to obtain more accurate prediction results [24]. To solve this problem, a trade forecasting method based on PSO optimized hybrid RVM model is proposed. Figure 6 shows PSO model and Figure 7 shows PSO optimization hybrid model. Firstly, this method finds out the indicators affecting import and export trade and extracts the principal factors of the indicators as the input data of the model through the principal component analysis method. Then on the basis of training single kernel RVM model with multiple different kernel functions, as shown in Figure 8, the hybrid kernel RVM model was constructed by multikernel weighting method according to the prediction error of single kernel RVM model. Finally, the parameters of the mixed core model are optimized by PSO to improve the prediction accuracy [25].

Among them, the self-built overseas warehouse mode has high requirements on the construction threshold, which is suitable for large cross-border e-commerce enterprises. The third-party overseas warehouse mode is built by a professional third party, which is economical and flexible, so it is suitable for mass cross-border e-commerce enterprises. The fourth-party overseas warehouse model is the development direction of the overseas warehouse in the future by building a cross-border logistics one-stop service platform with an overseas warehouse as the core for all kinds of cross-border e-commerce enterprises. However, due to the immature construction conditions and too strong resource integration, this model is still in the stage of research,

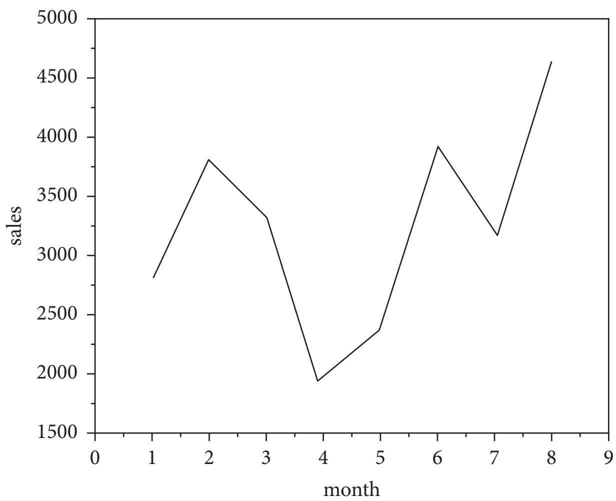

Figure 6: PSO model.

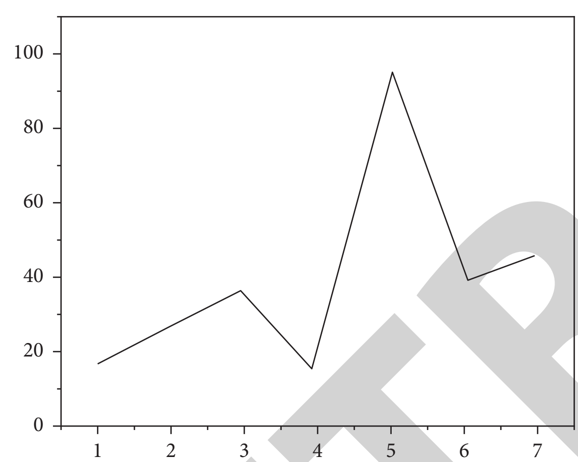

Figure 7: PSO optimized hybrid model.

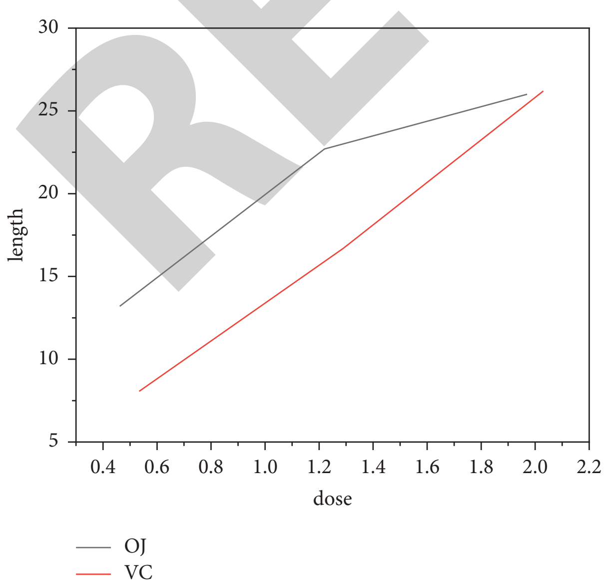

Figure 8: Single core RVM model prediction.

exploration, and attempt [26]. This paper combs the influencing factors of overseas warehouse location under different modes from the macro, MESO, and micro levels. Then, through the construction of an evolutionary game model for enterprises, overseas warehouse subjects, and customers, through the stability analysis of the evolutionary game and based on the replication dynamic equation, this paper studies the strategies of different subjects for different overseas warehouse modes. Finally, using the particle swarm optimization algorithm, the location models of self-built overseas warehouse and third-party overseas warehouse are constructed respectively, and the two enterprises are selected to adopt different overseas warehouse models, and the location of the overseas warehouse in Europe is analyzed empirically. The empirical analysis shows that the self-built overseas warehouse model only considers the transportation cost, warehouse building cost, and storage cost directly related to the overseas warehouse when selecting the location of the overseas warehouse. When the third-party overseas warehouse is located, the transportation cost from cross-border e-commerce enterprises (sellers) to the domestic warehouse and the warehouse construction and storage cost of the domestic warehouse need to be additionally considered [27]. With the rapid development of cross-border e-commerce, traditional cross-border logistics has many shortcomings, such as high logistics cost, long distribution time, and low customer satisfaction, which can no longer meet the development needs of cross-border e-commerce, thus giving birth to the rise of overseas warehouses. In the development process of the overseas warehouse, how to choose overseas warehouse mode and determining the location of the overseas warehouse are the key. In the context of cross-border e-commerce, how to choose different overseas warehouse modes and location suggestions from both qualitative and quantitative aspects is the theme of the research. Review the relevant literature on cross-border e-commerce, cross-border logistics, overseas warehouse, and overseas warehouse location, and summarize the previous research results.

5. Conclusion

By constructing the double objective optimization model with the minimum total cost and the maximum customer satisfaction, the particle swarm optimization algorithm is solved, so as to give the specific scheme for the location of the overseas hub warehouse and overseas warehouse. The results show that the distance between logistics network nodes and the storage cost of the overseas warehouse have a great impact on the location of the overseas warehouse. We should try our best to build overseas warehouses in countries with large trading volumes, so it is very important to accurately predict the trading volume. On the problem of overseas warehouse location, it breaks through the limitation of qualitative research on an overseas warehouse in the past and uses integer programming to study the problem quantitatively, which provides a method for the practical operation of overseas warehouse location. At the same time, the particle swarm optimization algorithm is used to verify the feasibility of the model. On the issue of cross-border e-commerce overseas warehouse location, only the total cost and customer satisfaction are considered. In fact, this issue is also related to many factors, such as cultural environment, business development model, bonded zone policy, and national trade agreement. These factors will be considered in future research.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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