Research on the Choice of E-commerce Logistics Mode from the Perspective of Environmental Protection

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Abstract. The continuous deepening of environmental problems has had a great impact on people's lives. Due to this situation, this protection has been highly valued by various countries in the world. Based on past work experience, this paper summarizes the structure and distribution problems of e-commerce enterprise logistics distribution under environmental protection, and makes reasonable selection of logistics distribution mode, perfects logistics distribution infrastructure, realizes low-carbon transportation, and pays attention to logistics distribution. The informatization construction discusses the countermeasures for logistics distribution of environmental protection e-commerce enterprises.

1. Introduction
In recent years, China's logistics industry has gradually formed a certain scale, but there is still a certain gap with the development requirements of e-commerce, which ultimately restricts the development of the e-commerce industry. Therefore, many e-commerce companies have increased their investment in logistics and distribution, aiming to improve the service level of e-commerce. Overall, e-commerce and the Internet have common characteristics. By contrast, e-commerce distribution and traditional business models are no different. The specific operational processes are also very similar, but they are closer to the e-commerce development in the new era. As a virtual economy based on information technology and traditional business models, e-commerce has a higher level of low carbonization and development potential. Paperless, low energy consumption and low emissions are e-commerce economic models and e-commerce service providers. One of the main competitiveness in the context of environmental protection. Further improve the logistics distribution system of e-commerce service providers and improve the quality and level of low-carbon development, not only meet the needs of environmental protection development requirements, but also objectively promote the e-commerce service providers to obtain comparative advantages in fierce market competition. Select.
2. Problems in the process of distribution of e-commerce enterprises under environmental protection

2.1. Improper selection of delivery mode
It can also be seen from the above discussion that the main development modes of e-commerce logistics include two types, namely self-built logistics and third-party logistics. In order to adapt to the market environment, enterprises will adopt a more novel way to cope with new market environment changes, such as the establishment of self-built logistics and third-party logistics cooperation mode, in the short-distance transportation, they will mainly rely on their own distribution methods. If the transportation distance is long, the choice of the third-party logistics distribution mode will be the main one [1]. On the whole, due to the different market development environment, enterprises should make use of their own distribution methods according to their own development conditions, laying the foundation for subsequent development. However, in the actual operation process, most of China's e-commerce enterprises mainly rely on self-built logistics and distribution, which leads to certain blindness in development. At the same time of cost increase, it is seriously inconsistent with the development theory of "environmental protection".

2.2. The logistics distribution base is relatively backward
Up to now, China's e-commerce is still in the early stage of development, and many distribution methods are still in the exploration stage, and the services involved cannot satisfy the overall needs of society. In addition, in the selection of expressway construction and logistics centers, it is also unable to match the current e-commerce distribution needs [2]. Coupled with the imperfect road transport network and the existence of many problems in the transportation line setting, it has seriously restricted the development of China's e-commerce logistics and distribution industry.

2.3. The level of logistics informationization in the distribution process is low
From the current development situation, China's e-commerce enterprise logistics distribution information level is low, and cannot be consistent with today's e-commerce development needs. In addition, in the process of enterprise development, too much emphasis on economic interests has led to great defects in information construction, resulting in the inability to achieve timely and effective communication between distribution centers and distribution points, third-party logistics and distribution points. Serious. In addition, in the circulation of merchandise purchase information and delivery information, it was also impossible to complete in the first time, which eventually led to the emergence of cargo backlog.

2.4. Lack of logistics and distribution talents
Due to the short development time of China's e-commerce enterprise logistics, talents in related fields cannot be matched with the current development, and it is difficult for enterprises to introduce more talents, which has a great impact on the development of enterprises. From the actual situation, most universities in China have established logistics majors, but almost all of them are in the stage of theoretical education, and there is not much research on case studies and practical activities. This has also led to aggravation of the lack of logistics and distribution talents in China, which is not conducive to the improvement of relevant management systems.

3. The structure of logistics distribution of e-commerce enterprises under environmental protection

3.1. The operating mode of e-commerce enterprises

3.1.1. Network Direct Mode. Direct sales refer to the sales model that directly sells products to the final customers without going through the intermediate wholesale links. In the process of profit
distribution, the direct sellers obtain partial profits from the previous agents and distributors [3]. Figure 1 shows the network direct sales model. In the mode of FIG. 1, "enterprise website" refers to a website in which a manufacturer of a conventional product sells a product of a company and provides a service to a consumer after registering a domain name on the Internet. The consumer's shopping process is: (1) the customer enters the homepage of the corporate website through the Internet; (2) view the product information published on the corporate website; (3) fill in the order information of the product after the customer selects the product; (4) choose the payment method (For example: electronic payment, cash payment); (5) after the enterprise verifies the order, the product is delivered to the customer.

![Figure 1. E-commerce network direct sales form](image)

3.1.2. Amazon mode. The Amazon model is characterized by the fact that the enterprise is only a platform for providing information. It is a virtual website enterprise that buys goods from production companies or wholesalers, sells products to customers through the network, and obtains the price difference. In the process, the website acting as a network sales intermediary role. Figure 2 is a map of the Amazon model. In Figure 2, "manufacturer or wholesaler" is not a direct provider of goods, it does not directly direct enterprise products to consumers. "Virtual Website" is an information platform. It has no physical stores. Its role is to communicate the supply and demand information of producers and consumers and provide various value-added services. In terms of delivery methods, "virtual websites" generally have their own distribution system or cooperate with third-party logistics companies.

![Figure 2. Amazon Logistics Model](image)

3.2. Improve the efficiency of e-commerce logistics distribution

3.2.1. Optimization of logistics distribution route. The key to implementing a loop picking in each area after clustering is to determine the route for the loop picking. In order to solve this critical problem, we built a mathematical model, solved it with genetic algorithm, and designed a visual
operation interface through MATLAB programming. The initial pick-up route can be obtained through the operation interface [4].

(1) Model assumptions
In order to model and solve the feasibility and relative rationality, we make the following assumptions on some issues: the supplier's geographical location and parts supply parts are known, and remain stable in the short term; all supplier parts are sent first. To the only collection center, and finally to the production line; the number of vehicles is sufficient to meet the demand, all vehicles must start from the assembly center, and finally return to the collection center, all vehicles travel at the same speed and are not allowed to overload; manufacturers to supplier parts The demand is only the earliest and latest delivery time requirement. The strict time window is determined by the supplier and the manufacturer and Anji after the line is determined. Everything works normally during the picking process, and no abnormal events occur.

(2) Model description
$N$ is the total number of suppliers; $i,j$ is a single supplier, $i,j=(0,1,2,...,N)$; $k=(1,2,...,K)$ indicates each vehicle number; $c_{ij}$ transport distance from $i$ to $j$ ; $\alpha$ unit transportation distance cost; $\beta$ unit vehicle fixed cost; $Q$ vehicle maximum Load capacity; $d_i$ supplier's supply; $t_{ij}$ vehicle's time from $i$ to $j$ , where $i \neq j$; $f_i$ vehicle's service time required to complete $i$ mission; $W_i$ vehicle's early arrival at customer's point $i$ required waiting time; $T_0^k$ vehicle $k$ Departure time; $T_R^k$ vehicle $k$ asks for the time of return.

It means that the total cost is the smallest. In order to improve customer service level and create more customer value, the total cost of recycling is divided into three parts: vehicle driving cost, vehicle fixed cost, time-advanced opportunity cost and time-delayed out-of-stock cost. The fixed cost of the vehicle refers to the cost of labor and management fees required for each vehicle to be activated. This target constraint can limit the number of vehicles used and the number of employees [5].

$$Min F = \sum_{k=1}^{K} \sum_{i=1}^{N} \sum_{j=1}^{N} \alpha C_{ij} X_{ij} + \sum_{i=1}^{N} \sum_{j=1}^{N} \beta X_{ij} + \sum_{k=1}^{K} \sum_{i=1}^{N} P_i(s_i)$$  \hspace{1cm} (1)

Recycling is a typical just-in-time supply logistics network transportation system, in which the restrictions of the unloading crossing and the continuous production of the main engine have strict
requirements on time. In order to minimize the total cost of the implementation process when designing the pick-up route, time-effect costs must be taken into account. The cost function expression is as follows:

\[
P_i(s_i) = \begin{cases} 
  p(e_i - s_i) & s_i < e_i \\
  0 & e_i \leq s_i \leq l_i \\
  q(s_i - l_i) & s_i > l_i 
\end{cases} 
\]  

(2)

The above formula can be expressed as:

\[
P_i(s_i) = p \max(e_i - s_i, 0) + q \max(s_i - l_i, 0) 
\]  

(3)

Where \( e_i \) represents the starting point of the service \( i \) allowed service window; \( l_i \) represents the end of the service \( i \) allowed service window; \( s_i \) the time when the vehicle arrives at the supplier \( i \); \( p \) represents the opportunity for the vehicle to arrive at the supplier to wait for the unit time in advance cost; \( q \) vehicle's unit time penalty value at the supplier's time window after the time window.

3.2.2. Reasonable choice of distribution mode, effective integration of distribution capabilities

(1) Selective use of the autonomous delivery mode. Autonomous distribution refers to the mode in which all aspects of enterprise logistics distribution are built and managed by the enterprise itself, and the distribution of goods inside and outside the enterprise is realized. It is conducive to the integrated operation of enterprise supply, production and sales. However, the independent distribution mode has a large investment scale. When the enterprise distributes less, the distribution cost and cost are relatively high, and the enterprise sometimes forms "big and complete" and "small and full." However, this model is not completely outdated. In some of today's larger group companies, such as enterprises with strong logistics control and processing capabilities, they can choose to use this model.

(2) Highlight the third-party logistics distribution model. Third-party logistics is a form of logistics specialization. It provides a provider with a logistics service that meets the demand side within a certain period of time by signing a contract with a third party, and relies on the integration of information to generate value-added, thereby gaining benefits. The third-party logistics distribution overcomes the defects of self-operated logistics distribution, simplifies the enterprise transaction process, enables the enterprise to allocate resources to the core business, and is conducive to cultivating the core competence of the enterprise. To choose third-party logistics, we must first regard high credit as a prerequisite for ensuring the performance of the contract; secondly, we must strengthen market research and select products that meet market demand for distribution; the third is to emphasize the construction of technical service teams and provide technical services for after-sales products. Make up for technical defects compared with self-operated logistics companies [6].

(3) Vigorously develop a common distribution model. In order to improve the efficiency of logistics, when distributing users to a certain area, the mode of distribution by many distribution companies is joint distribution. This is a collaborative distribution model for logistics distribution services between logistics distribution enterprises to realize the rationalization of overall distribution and mutual benefit and mutual convenience. It highlights the "four modernizations", namely, the commonality of distribution, the common use of logistics resources, the common use of logistics facilities and equipment, and the commonality of logistics management. The common distribution model is an effective way to leverage the advantages of clusters and integrate distributed resources. At present, most of China's logistics distribution enterprises under the "small, small, scattered, weak" situation to develop a common distribution model can greatly improve the efficiency of logistics operations, reduce business operating costs, can enable enterprises to concentrate on core business, social logistics sharing and efficient use of resources.
(4) Boldly try the logistics alliance distribution model based on virtual logistics enterprises. Logistics alliance based on virtual enterprise refers to the enterprise that uses computer technology, network technology and communication technology to rely on external logistics resources to carry out logistics agency business. After obtaining the distribution business information from the supplier through the Internet, it searches for the most through the Internet. Good distribution agent, and signed an agreement with it to establish a dynamic alliance of logistics and distribution, and then entrust the distribution business to the agent, who is responsible for completing the distribution business according to the agreement.

4. Conclusion
In the process of environmental protection development, e-commerce logistics enterprises should effectively highlight the concept of low-carbon distribution, and formulate improvement measures for e-commerce enterprises in the development environment. In order to avoid the increase of energy consumption, relevant enterprises should fully introduce advanced technology to avoid other work being affected. Environmental protection should be combined with e-commerce logistics and distribution work to achieve sustainable development of various industries while conserving social resources.

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