B2C Rural E-Commerce Logistics Mode Selection Based on Big Data Technology and Analytic Hierarchy Process

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Abstract—B2C rural e-commerce has a broad prospect, but it is imperative to solve the problem of optimization of logistics distribution. This paper makes an in-depth analysis on the logistics mode selection and commodity distribution path design of B2C rural e-commerce, puts forward and solves the mathematical models for the logistics mode selection and distribution path design, so as to obtain the optimal solution. Construct the index hierarchy that affects the selection of distribution mode, and then use the fuzzy analytic hierarchy process to analyze and obtain the optimal distribution mode.

Keywords—B2C Rural E-Commerce;Model; Big data technology; Analytic Hierarchy Process.

1 INTRODUCTION

With the development of information technology, China's e-commerce industry is developing rapidly, and the overall transaction scale of e-commerce market continues to reach a new high. However, the development of e-commerce in China is unbalanced. Urban e-commerce is active, while rural e-commerce develops slowly [1]. According to the latest data released by the Ministry of Commerce, the online retail sales of e-commerce in 2020 was 11.8 trillion yuan, including 1.8 trillion yuan in rural areas, accounting for less than 20% of the national online retail sales. In addition, people's demand for "village Amoy" is growing in both urban and rural areas. Therefore, the development of rural e-commerce has great space and potential. However, in the process of the rapid development of rural e-commerce, there are still many problems of distribution, which seriously affects the implementation of China's "express to the countryside" project, the improvement of the quality of life of farmers and the realization of building a well-off level in an all-round way.

2 RURAL E-COMMERCE LOGISTICS DISTRIBUTION MODEL

B2C rural e-commerce is the form of e-commerce from enterprises to farmers and consumers[2].E-commerce enterprises are based in rural areas, serve farmers and sell goods to farmers in the mode of online sales. Although the express industry is developing rapidly at present, the express industry in villages and towns and rural areas is still relatively backward. Express delivery reaches most towns but rarely villages. How to solve the "last mile" problem

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of logistics distribution is the key to the success or failure of e-commerce enterprises, which directly affects customer satisfaction.

Logistics plays an important role in the development of rural e-commerce. Because the rural population lives scattered, the cost of rural logistics distribution is high, and there is a lack of professional logistics talents in rural areas, which affects the logistics distribution work in rural areas to a certain extent. According to the different subjects of logistics operation activities, the logistics modes of B2C rural e-commerce enterprises at this stage mainly include self operated logistics, third-party logistics, fourth party logistics and logistics alliance.

2.1 Enterprise self operated logistics distribution mode.

E-commerce enterprises organize and operate logistics business and complete logistics distribution. This requires enterprises to have certain financial conditions, warehouses, transportation vehicles and experienced operators, establish logistics distribution and management system, and complete the logistics activities required by enterprises through the integration of resources and functions.

2.2 Third party logistics distribution mode.

After users purchase goods on the B2C e-commerce platform, the third-party logistics is responsible for logistics distribution. At present, express delivery enterprises such as Postal EMS, Shentong, Yuantong, Zhongtong and Yunda have set up distribution points in villages and towns, but the problem of "the last kilometer" has not been well solved. Express delivery to distribution points in villages and towns is basically carried by users and rarely delivered to the door.

2.3 The fourth party logistics model.

Supply chain integrators use subcontractors to control and manage customers' point-to-point supply chain operations [3]. The fourth party logistics enterprise not only manages logistics activities, but also provides a complete set of supply chain solutions through its information technology, integration ability and other resources to help B2C e-commerce platform reduce costs, effectively integrate resources, provide fast, efficient and personalized services, and make the process of the whole logistics system more reasonable and effective.

2.4 Logistics alliance model.

Logistics alliance is a strategic partnership between enterprises and other enterprises by signing contracts to share risks and benefits in order to achieve logistics objectives. B2C e-commerce enterprises can effectively reduce logistics costs and improve service levels through the logistics alliance model.

3 COMPARATIVE ANALYSIS OF B2C RURAL E-COMMERCE LOGISTICS MODEL

Logistics is an important factor affecting the development of rural e-commerce. The logistics mode adopted by B2C rural e-commerce is affected by the actual situation of e-commerce enterprises.

3.1 From the perspective of enterprise operation efficiency

Self operated logistics enables e-commerce enterprises to enhance their independent management of logistics, cooperate more closely with all links of the supply chain, and develop more coordinated and stable enterprises. Each department within the enterprise has a common goal. The self operated logistics is easy to coordinate, which reduces the operation cost of the internal supply chain, makes the management and monitoring of the supply chain more convenient, and ensures the stability of the supply chain. At the same time, self operated logistics ensures the safety of internal information exchange of e-commerce enterprises and avoids the leakage of internal information.

Because the professional ability of third-party logistics is relatively strong, e-commerce enterprises cooperate with third-party logistics companies to optimize the supply chain, shorten the response time to customer needs, and realize the rapid and safe delivery of goods. The third-party logistics company has a high degree of logistics informatization, which makes it convenient for customers to query the logistics progress of purchased goods at any time, improves customers' purchase satisfaction, reduces the time for customer service to receive customers to consult by telephone and other means, and improves the operation efficiency of e-commerce enterprises.

3.2 From the perspective of enterprise operation cost

From the perspective of strategic integration, self operated logistics simplifies the internal supply chain and reduces the operation cost of the whole supply chain. However, the investment of enterprise self operated logistics is relatively large. After completion, only large-scale logistics can reduce the cost, otherwise it may be unprofitable for a long time. After the self operated logistics system is completed, the enterprise needs professional logistics management personnel to manage, which requires the enterprise to cultivate or recruit professional personnel, which increases the management cost of the enterprise to a certain extent.

E-commerce enterprises contract logistics to third-party logistics companies, which saves a large number of funds invested in logistics facilities, reduces the burden of enterprises and reduces the pressure and risk of enterprise operation.

3.3 From the perspective of enterprise controllability

The enterprise operates its own logistics, controls all nodes of the operation, and has high control in terms of transaction time and transaction situation. Logistics is operated by a third party, which is greatly affected by the development maturity of the third party logistics enterprise. In case of untimely delivery, wrong delivery, damage and loss, it will affect consumers' satisfaction with B2C e-commerce enterprises and damage the social image and

reputation of e-commerce enterprises. Even if B2C e-commerce enterprises and logistics companies have signed contracts before, it is B2C e-commerce enterprises that will really suffer from logistics problems.

4 B2C RURAL E-COMMERCE LOGISTICS MODEL SELECTION MODEL

Domestic and foreign experts and scholars have carried out a lot of research on the logistics mode selection of e-commerce enterprises. Ballow, an American Logistics scientist, put forward a two-dimensional decision-making model of logistics (as shown in Figure 1) [4]. When the ability of enterprise logistics management is not high, it is suitable to outsource (logistics has little impact on enterprise success) or outsource logistics (logistics has a great impact on enterprise success); When the ability of enterprise logistics management is high, self operated logistics can be used, and when the impact of logistics on enterprise success is relatively low, self operated logistics can also provide external services.

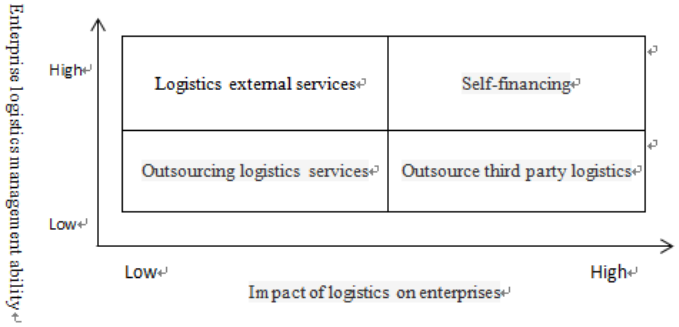

Fig.1 two-dimensional decision model of logistics

For B2C e-commerce enterprises, the importance of logistics to enterprise development is self-evident, but the scale, economic strength and management ability of enterprises determine whether enterprises can self manage logistics. When B2C rural e-commerce enterprises choose logistics mode, logistics cost is an important factor to be considered. The ability of an enterprise to establish its own logistics system and logistics management determines whether an enterprise can operate its own logistics. While considering costs from their own perspective, enterprises must also pay attention to service quality from the perspective of customers. Considering the two factors of logistics cost and service quality, we form a B2C rural e-commerce logistics selection model (as shown in Figure 2).

The model is established according to two dimensions: logistics cost and service quality requirements. When reducing logistics cost is the most important consideration, if the requirements for logistics service quality are not high, you can choose third-party logistics or logistics alliance. If the requirements for logistics service quality are relatively high, you can choose self operated logistics, and self operated logistics provides external services to increase logistics revenue and reduce the cost of self operated logistics in a disguised way. If the

enterprise puts the cost in the secondary position and the factor of logistics service quality in the first place, it is recommended to choose self operated logistics.

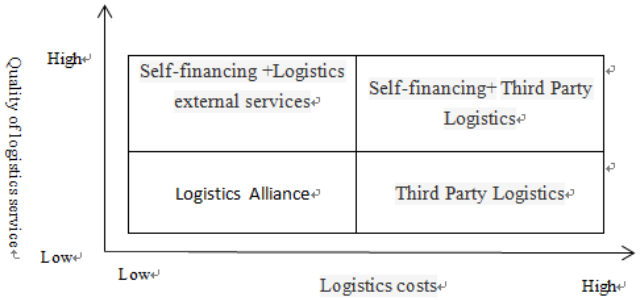

Fig. 2 B2C rural e-commerce logistics selection model

5 B2C RURAL E-COMMERCE "LAST MILE" LOGISTICS SOLUTION

The problems of low efficiency, insufficient distribution capacity and high distribution cost of rural logistics distribution are prominent. The logistics problem of the last kilometer of rural e-commerce has not been well solved. How can we build an express service system with inclusive urban and rural areas, advanced technology, high-quality service, safety and efficiency, green and energy-saving, and basically realize that there are outlets in villages and towns and express delivery in every village[5]? You can try the following methods:

5.1 Set up service stations in rural stores, supermarkets or schools

Generally speaking, each village (neighborhood) has retail stores or supermarkets, as well as primary schools or kindergartens. You can rely on the village's retail stores, supermarkets or schools to establish express service stations. Express or logistics companies send the goods purchased by farmers on the B2C e-commerce platform directly to the service station. Villagers can sign for the goods purchased online by picking up and seeing off children and buying goods in stores or supermarkets. If the villagers are not satisfied with the goods and need to return and exchange the goods, they can also complete it directly at these service stations.

5.2 Improve cooperation with China Post Express

China Post has always enjoyed a high reputation in the vast rural areas, which is a rare market advantage. Postal express delivery business has basically covered the whole country. Logistics distribution has penetrated into towns and villages, forming a relatively perfect rural distribution network system. Therefore, the e-commerce platform can choose to cooperate with postal express to make postal express the main body of rural e-commerce to the countryside, and use the advantages of postal express in rural e-commerce distribution to solve the problem of rural e-commerce distribution.

5.3 Establish a new model of shared Logistics

Establish a local logistics home service platform to solve the last kilometer problem for trunk logistics companies and truly realize the supply side reform of logistics and transportation services. The home logistics service platform establishes county (District) level distribution centers and distribution stations to undertake the goods sent by national logistics companies to rural areas, and then takes service outlets and rural service stations as the center to provide fixed-time, fixed-point and fixed-person services by logistics shuttle buses. The service platform should ensure the safety of goods. It is best to provide basic insurance services free of charge and strive for rapid claim settlement. The service platform shall provide high-quality customer service, and the large parts shall be able to provide door-to-door delivery and installation services according to the needs of customers. Through the establishment of shared logistics and the establishment of a new shared ecology, the logistics distribution cost has been effectively reduced and the "last kilometer" of rural logistics distribution has been opened up.

5.4 Build a county and township level operation system of "County Service Center + rural service point"

B2C rural e-commerce platform should actively build a county-level and township level operation system of "County Service Center + rural service point", successively build county-level operation center, logistics distribution center, town level service center and village level service station, and solve the problem of rural "last kilometer" distribution by improving channel construction.

6 CONCLUSION

The vast rural market has great potential. The development of rural e-commerce has a great impact on the prosperity of rural economy and the improvement of farmers' living standards. To make rural e-commerce bigger and stronger, the government needs to increase investment, improve rural power distribution infrastructure and rural logistics infrastructure, accelerate the construction of township logistics network nodes, and improve rural highway infrastructure. Although B2C rural e-commerce has broad prospects, it is imperative to solve the "last kilometer" problem of logistics distribution. By big data technology and Analytic Hierarchy Process, constructs the index hierarchy that affects the selection of distribution mode, and then uses the fuzzy analytic hierarchy process to analyze and obtain the optimal distribution mode.

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