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The Status & Future Trend of the Last Mile Distribution Mode in Chinese Cities

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***Abstract*—With the improvement of people's living standard, there is more general demand and higher demand for logistics in people's daily lives. The last mile of a city's logistics is very important because its cost accounts for nearly 30% of the total cost. Therefore, it is of great significance to study the last mile distribution mode of a city in China. It is concluded from scholars that the distribution mode of the last mile of city in China is developing in many ways, including direct distribution mode and indirect distribution mode. The indirect distribution mode includes convenience store cooperation mode, community property cooperation mode, self-helping point mode, self-helping cabinet mode, fourth-party logistics platform mode, metro logistics mode, 1 ¥ logistics mode, crowdsourcing logistics mode and J.D. mobile car. In the future, UAV distribution model and underground pipeline distribution model will probably have a huge market, and block chain because of its special advantages will also be possible to apply to the last mile of urban distribution practice in China.**

Keywords—the last mile; distribution mode; status; future trend

I. BACKGROUNDS

With the development of e-commerce and the improvement of living standards in China, people have more demand and higher requirements for logistics. According to official data of the State Post Office, the volume of China's express delivery service business reached 50, 710 million in 2018, an increase of 26.6% over the same period last year, and business income totaled 603, 840 million yuan, an increase of 21.8% over the same period last year. The above data shows that the express industry has developed rapidly in China and has penetrated into the lives of ordinary people. At the same time, the urban express volume occupies an absolute proportion in the total delivery volume, which has a more significant meaning for the study of urban express. The last mile of cities, as an important part of China's urban logistics, has a direct impact on the overall results of logistics operation, attracting many scholars for studying at home and abroad. This paper summarizes the current situation and future development trend of the last mile distribution in China in order to provide some reference for fellow researchers.

II. INTRODUCTIONS OF THE LAST MILE

The last mile is not a specific quantifying distance but an important link to complete the logistics distribution system. It means that customers purchase goods through e-commerce or send them by personal mail. After the goods are transported to the designated distribution point, the logistics enterprises will deliver the goods from the nearest sorting center to the customers and complete the service [1]. As the last procedure of logistics distribution, the last mile is of great significance. Firstly, the improvement of the last mile's efficiency helps to reduce the logistics cost. Relevant data show that although the distance of the last mile is relatively short, its cost is about 30% of the total cost. If a scientific and reasonable distribution mode could be found to improve the distribution efficiency, it will effectively reduce the total logistics cost. Secondly, improving the service level of the last mile can effectively improve the user experience, and then improve user satisfaction. The last mile experiences the longest contacting time for enterprises and customers during all procedures, and directly affects the overall evaluation and satisfaction of customers to enterprises as it is the most direct link for logistics enterprises to transfer enterprise value and influence consumers. Therefore, improving the last mile distribution service level can effectively improve customer satisfaction and loyalty. Finally, the effective collection and collation of the data of the last mile will help enterprises to enhance their competitiveness in the era of big data, during which client data is very important, because mining the value information in the last mile can provide a scientific reference for logistics strategy.

III. THE STATUS OF THE LAST MILE DISTRIBUTION MODE IN CHINESE CITIES

At present, China's logistics industry has been developed. The last mile of the city has been significantly improved in terms of ways, technologies, efficiency and customer satisfaction. Scholars divide the distribution mode into direct distribution mode and indirect distribution mode. The direct distribution mode refers to the one in which the express enterprise delivers goods directly to the home or delivers the customer's goods to the designated place within a certain period of time to realize the handover. On the other hand, the indirect distribution mode refers to the delivery mode in which the logistics enterprise delivers the goods to the designated place according to the customer's requirements and the customer goes to pick up the goods by himself. For both of them, the direct distribution mode is relatively simple, which is the direct "transaction" between express delivery enterprises and consumers, while the indirect distribution mode involves

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the third party besides express delivery enterprises and consumers, which is relatively complex. At present, most of the distribution modes discussed by scholars are indirect distribution modes, and the specific indirect distribution modes of the last mile are as follows.

A. Convenience Store Cooperation Model

Express enterprises cooperate with convenience stores in or near consumer communities to temporarily store express in convenience stores, and then customers go to the designated convenience stores to acquire their packet in their spare time. The model can be applied to the case of small volume, ordinary value commodities and moderate regional distribution volume [4]. This model requires convenience stores operate for 24 hours. Meanwhile, there are rigid requirements for package size and corresponding value of goods, but there are no rigid requirements for payment methods, for cash or credit card can be used. In addition, the basis of the cooperation mode of convenience stores is that convenience stores have a set of information system to connect with e-commerce enterprises or logistics enterprises, so as to ensure the tracking and information feedback of express delivery. At present, this mode is widely used in Taiwan and Japan, and in the mainland, SF has also started trial.

The advantages of this distribution model are very obvious [5]: logistics enterprises and convenience stores are mutually beneficial. On the one hand, for convenience stores, items receive a certain commission. Furthermore, this model brings passenger flow to convenience stores and increases their commodity sales. On the other hand, for logistics enterprises, there is no need to rent additional sites and recruit personnel, which saves their construction costs and operating costs. However, for logistics enterprises, the model also has some shortcomings: (1) when goods are damaged, the responsibility is difficult to define; (2) convenience stores have limited space to use, so the size and quantity of goods are limited; (3) convenience stores share part of the profits which may belong to logistics enterprises; (4) logistics enterprises do not directly connect with customers so that they cannot guarantee its service quality and level.

B. Community Property Cooperation Model

Logistics enterprises or e-commerce enterprises cooperate with property companies in community or office buildings to deliver commodities to corresponding property offices. Customers can pick up goods in designated areas within a certain time, while some property company provide door-to-door delivery service. The premise of this model is that the community property company or office property company will sign the relevant responsibility statement with the owner in advance, in which the rights, responsibilities and obligations are defined to avoid unnecessary disputes. At present, SHENTONG, YUANTONG and other express companies based on this cooperation mode have already collaborated with the Vanke Estate in order to assist the work of the last mile distribution [5].

The advantages of this model are obvious: (1) the property space of residential area or office building with storage space is large and there is almost no restriction on the size and quantity of express delivery. (2) For consumers, it's free for them to pick up goods. (3) Logistics enterprises do not need additional leasing sites and personnel recruitment, which saves construction costs and operating costs. While the shortcomings of this model are also very obvious: (1) the traceability of goods is weak due to the limited cooperation between property and express delivery enterprises, and (2) the responsibility is difficult to define, once the goods are damaged or lost, the responsibility definition will be very difficult [5].

C. Self-helping Point Model

Logistics companies or e-commerce enterprises can build their own express points and undertake their own operations according to their development needs and the network layout plan in the city [6]. As a part of logistics, the self-helping point's location is fixed, which make it suitable for the situation of large regional distribution volume. At present, the mode has been put into practice in China and operate effectively, such as the self-helping points of Shun Feng and JINGDONG in colleges, Taobao's small post office etc. [5].

The advantages of this model are: (1) direct contact with consumers, effectively enhancing customer experience and customer satisfaction, and (2) space advantage is obvious, which could offer some big space for a large number of packages. The shortcomings of this model are high construction fee of the self-helping point in the early stage and the high operation and maintenance cost in the later stage.

D. Self-Service Cabinet Mode

The self-service cabinet mode is that express delivery enterprises set up self-withdrawing containers in residential areas, subway, business buildings or supermarkets. Customers fill in the receiving address as designated self-withdrawing containers, and then pick up the goods from designated containers according to the delivery code sent by express delivery system. Generally speaking, self-service cabinets are open all day, providing great convenience and flexibility. According to the current operation of self-contained containers, goods will be kept in the self-contained containers for a certain period of time, during which if no one comes to collect, the delivery company will send SMS messages to remind customers to come to collect goods again. If no one picks up the goods within the specified time after the second reminder, the goods will be sent back to the distribution center. At present, the mode is mainly operated in the areas with high quality of consumers around among by e-commerce platform and the fourth party logistics, such as Jingdong, HIVE BOX, Cainiaoyizhan, Suyidi etc.

The advantages of the self-service cabinet are: (1) self-service, convenient and fast; (2) easy to identify the responsibility of goods by monitoring the video; (3) low human cost for no special personnel to operate the self-service cabinet. While the shortcomings are: (1) high construction cost as enterprises need to build self-withdrawal cabinets in the early stage, and (2) limited the storage space so that the size and quantity of packages are greatly limited [5].

E. The Fourth Party Logistics Platform

The fourth party logistics platform is an organization led by a company, which integrates the existing third-party express delivery. At present, there are mainly the Fengchao [8], Ali's rookie station [9] and the SUYIDI, which is created by China Post Capital, Santai Holdings, Cainiaowangluo and Fuxing Capital [10]. Specifically, the CAINIAOWANGLUO has integrated Baishihuitong, Yuantong, Yunda, Zhongtong, Shunfeng and so on. Fengchao has integrated Shunfeng, Yuantong, Zhongtong, Shentong, EMS, Yunda, and so on. Suyidi has already integrated Yuantong, Zhongtong, Shentong, Yunda, Baishihuitong, Tiantian Express, EMS, Shunfeng and Jingdong. These three companies have integrated most of the express delivery resources, known as the last mile distribution mode which is widely used in the mainland of China.

F. Metro Logistics Model

With the help of the urban subway for the last mile distribution of e-commerce, the advantage lies in the relatively wide coverage of urban subway, fast running speed and no traffic jam. In addition, it is easy to find the position at the exit of the subway station and saves time and cost. However, this mode has many limitations, such as time constraints (specific time), limited cost (limited carrying quantity) and Limited package size (limited subway space). Therefore, it is only suitable for consumers with pressing time and adequate budget. Now, there are only a few applications in Beijing [5].

G. 1 ¥ Logistics Mode

The 1 ¥ logistics mode is a kind of collect-package-offered-by-others business mode, started for the sharp increase of campus package business. Initially, college students started their own businesses, by offering collecting package service and collecting one yuan as a reward. This model has solved the inconvenience and untimely problem for some university consumers [11]. For express companies, the advantages are obvious: zero cost expenditure, convenient for customers to receive and send, and service costs paid by customers. However, the model has certain risks: customers and workers do not sign relevant agreements, which easily leads to express companies and worker united to form "overlord express", forcing the collection of service fees, and social impact is not good. At present, this model is mainly applied in the areas with large population such as campus and office buildings.

H. Crowdsourcing Logistics Mode

In June 2006, Jeff Howe firstly defined crowdsourcing as "a company or an organization that outsourced the tasks previously performed by its employees "[12]. Crowdsourcing distribution mode is the application of crowdsourcing to the field of logistics distribution, outsourcing the distribution professional tasks to the public in a free and voluntary way. Crowdsourcing distribution is an important way to improve the terminal logistics distribution. It is an important practice and application of "Internet +" concept, and a relatively avant-garde logistics distribution mode [13]. However, the crowdsourcing logistics is risky, and the crowdsourcing couriers are not professionally trained, so the controllability is weak, and the efficiency and quality of distribution cannot be guaranteed. At present, the companies that use crowdsourcing logistics mainly include RENREN express, Jingdong crowdsourcing, DADA, FLASH, E-express, NINSHUOWOBAN, 51 Express, etc.

IV. THE FUTURE TREND OF THE LAST MILE DISTRIBUTION MODE IN CHINESE CITIES

In addition to the existing distribution modes mentioned above, some scholars have put forward the following ideas about the last mile distribution mode and related technologies in the future. Some of these modes or technologies have entered the stage of planning or even trial implementation.

A. UAV Distribution Mode

UAV express uses self-contained program to control device, and uses radio remote control equipment to control UAV low-altitude aircraft to deliver parcels to the destination. The advantage of this mode is that it can effectively avoid traffic congestion in cities and improve distribution efficiency. At the same time, it doesn't require conduction by man, which could reduce cost. The main drawback lies in the inability of UAVs to deliver goods in bad weather, and the damage caused during flight [15]. At present, SHUNFENG Express has been implemented the mode in a small area. In the future, unmanned express will be used more widely in the last mile of urban and rural areas [16].

B. The Underground Pipe Mode

The urban underground logistics in foreign countries has achieved some results for starting in an early time, while China's underground logistics is only at the stage of R & D and planning at present, and its progress is slow. In 1996, the Dutch began to study the underground logistics system connecting Hoofd-dorp railway station, Schiphol airport and Aslwmeer flower market, and successfully operated in 2004. In 1998, Germany began to develop an underground logistics system for about 80 miles, and it gradually expanded. At present, the Cargo-cap underground pipeline logistics distribution system used in Germany should be the highest form of pipeline logistics system. Research on underground logistics in Germany, Japan and the United States shows that the underground logistics system can bear 30% of the total express delivery, and effectively alleviate the pressure of express delivery. In November 2016, it was explicitly proposed that in 2020, a new 100 km underground integrated pipe system in Shanghai would be built to achieve intensive use and sustainable development of underground space, but it is still only in the research and planning stage [17].

C. Application of Block Chain Technology

Block chain has great application potential in logistics distribution scenarios because of its characteristics of decentralization and non-tampering. The combination of block chaining technology and RFID technology can effectively improve the efficiency and solve many problems of the last mile distribution in cities. Because of the strong privacy of the block chain, the block chain is used as a means of information transmission. Only by getting the transaction private key, the two transaction sides can obtain the right to read information.

After the customer signs their names for the goods, and the electronic tag is sent to the express cabinet to recover and clear personal information, the personal information security is more effectively guaranteed [18].

V. SUMMARY

After a long period of development, the last mile distribution mode of China's cities has shown a variety of trends. Direct distribution mode, convenience store cooperation mode, residential property cooperation mode, self-helping point mode, self-helping cabinet mode, fourth-party logistics platform mode, metro logistics mode, 1 ¥ logistics mode, crowdsourcing logistics mode and J.D. mobile car are all important parts of the last mile distribution of Chinese cities. In the future, UAV logistics mode and underground pipeline distribution mode will have a huge market, and block chain technology may also be applied to the last mile distribution practice of China's cities because of its special advantages. Under the current distribution mode, there must be some problems, such as the partners' monitoring problem under the cooperation mode, the distribution of interests of all parties under the fourth party logistics platform mode, the issue of trustworthiness of the workers in the crowdsourcing logistics and the 1 ¥ logistics mode, but these problems can't hinder the development of the last mile distribution mode of urban logistics in China.

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