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Research on the "Last Mile" End Delivery of Personal Consumer Goods Logistics

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Abstract

The end of pipe logistics of personal consumer goods has become a key link in the development of e-commerce. Due to the constantly accelerating pace of life and the pressure of demand for essential items and medical supplies in the community, people's demand for end of pipe delivery of express delivery and takeout has shown an explosive growth. The quality of last mile delivery services still needs to be further improved. This article starts from the reality of the "last mile" delivery of personal consumer goods logistics, introduces the characteristics of different delivery modes, analyzes the factors that affect the quality of personal consumer goods logistics services, deeply studies the difficulties faced by the "last mile" delivery system, and finally puts forward corresponding suggestions for the future development of personal consumer goods logistics delivery.

Keywords

Personal consumer goods, Logistics, Last mile.

1. Introduction

With the rapid development of the Internet, e-commerce has become an important part of people's life because of its convenience, economy, diversity and other advantages. More and more consumers are willing to choose to buy various commodities such as daily necessities, books, household appliances and so on through the Internet, which makes online shopping enter people's life and gradually become an important part of social and economic life. According to the data of China Internet Network Information Center, by June 2024, the number of online shopping users in China had reached 905million, accounting for 82.3% of the total number of Chinese Internet users. In the first half of 2024, the online shopping market maintained steady growth and played an increasingly positive role in promoting consumption. According to the National Bureau of statistics, China's online retail sales in the first half of the year were 7099.1 billion yuan, up 9.8% year on year. Among them, the online retail sales of physical goods increased by 8.8% year on year, accounting for 25.3% of the total retail sales of social consumer goods, and the proportion continued to increase. The data shows that China's online shopping has entered a stage of rapid development. How to attract consumers to try online shopping is no longer an urgent problem for e-commerce enterprises to solve, but how to provide higher quality shopping experience.

Among them, how to improve the distribution service is a major challenge for e-commerce enterprises. The convenience of obtaining goods is the biggest advantage of online shopping over physical shopping, and this process depends on the efficiency of logistics. The "last kilometer" distribution at the end of logistics is the bottleneck of the logistics efficiency of personal consumer goods, which has become a key link affecting consumers' online shopping experience. The last kilometer, as the final link of logistics distribution, refers to the distance from the distribution center to the distribution center to the customers' hands after distribution

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from the logistics center to the distribution center. Here, the last kilometer refers to the precise service process of transporting products from the sorting center or distribution point to the customers' hands with the help of trams and other transportation tools. The door-to-door short-distance distribution service can achieve face-to-face close contact with customers, which can not only meet consumers' shopping experience to the greatest extent, but also increase customers' consumption demand in the future [1].

In the distribution logistics of personal consumer goods, community distribution is the end link of commodity logistics, which usually refers to the transfer and distribution process of goods from distribution stations or local warehouses, retail stores and other distribution centers to residents' hands. It has always been the bottleneck of the distribution link. Due to the large number of destinations and the small volume of goods transported at a single address, this link has brought great difficulties to vehicle scheduling and staffing, and sometimes has to face complex road problems. Therefore, how to deal with the problem of "the last kilometer" of the end logistics of personal consumer goods is of great significance for the distribution efficiency and development of the distribution system of the logistics industry in the future.

2. Characteristics of personal consumer goods logistics

2.1. Multiple delivery nodes and complex delivery system

Personal consumer goods logistics mainly serves general residents and various types of objects such as small supermarkets, convenience stores, wholesale markets, etc. Its distribution density varies, resulting in a large number of logistics nodes. At the same time, the distribution service demands of end consumers are widely distributed in various urban and rural areas, with complex road networks and constraints such as "last mile" road bottlenecks, making the logistics end of pipe distribution system even more complex.

2.2. Small batch size, diverse varieties, and high frequency.

The vast majority of personal consumer goods logistics is designed to serve end consumers. With the development of the economy and the improvement of residents' consumption levels, as well as the characteristics of online shopping, which has a wide variety of products and many choices for consumers, consumers tend to shop in small batches, multiple varieties, and high frequency, frequently comparing the quality and cost-effectiveness of different products, rather than purchasing a large number of similar products at once. Therefore, it also makes the logistics transportation of personal consumer goods characterized by small batches, multiple varieties, and high frequency.

2.3. There are many factors that can cause delays

Due to the large number of delivery nodes and complex routes, the logistics delivery process is easily affected by weather and road conditions, as well as unexpected situations such as delivery peaks and road congestion, which are not conducive to delivery efficiency; In addition, there are usually many customers who need to be delivered, and in cases where the delivery destinations are scattered or the quantity of goods is large, timely delivery may also not be possible.

3. Classification of End of Line Logistics for Personal Consumer Goods

In order to meet the growing personalized "last mile" delivery needs of online shopping consumers, e-commerce continues to improve delivery services to enhance the quality of last mile delivery services. However, consumers have significant diversity in their choices of delivery modes, service methods, and delivery time slots. Researchers have conducted relevant analysis on last mile delivery services, dividing delivery modes into two types: self pickup at

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freight outlets and door-to-door delivery [2], and further dividing self pickup freight outlets into manned self pickup points and unmanned self pickup points (such as self pickup cabinets) [3,4].

In the service mode of manned self pickup points, there are dedicated personnel who provide delivery services such as goods sorting and extraction information notifications, as well as part-time non dedicated personnel who provide services (such as convenience store owners, laundry shop owners, etc.). Therefore, the service mode of manned self pickup points can be further subdivided. The mode where dedicated personnel provide delivery services is called professional service mode, and the mode where non dedicated personnel provide delivery services is called non professional service mode. In the manned self pickup service mode, Cainiao Station is a typical representative. Cainiao Station is a subsidiary of Cainiao Network Company and a fourth party logistics platform under Alibaba. It belongs to the professional service model, and its main operating mode is that after the goods are stored, the package is first collected by the station. The station issues a pickup code to the consumer, and the user can come to pick up the package with the pickup code.

The service mode for non professionals is to establish cooperation between logistics companies at the end and shops in different residential areas of the city to achieve last mile pickup services. After the express delivery company arranges the business volume, the courier will deliver to the store and inform the customer through phone or text message after completion. However, the package security and the division of rights and responsibilities of this model cannot be guaranteed, so the customer's experience and satisfaction are not high. The typical representative of unmanned self pickup points is intelligent express lockers. Smart express cabinets are a concept that combines logistics terminals with intelligent devices, and are an emerging phenomenon that continues to develop with the express delivery industry. His main mode is: after the courier confirms their identity, they enter the package information, and after the package is placed, the system automatically sends a text message containing the branch address and verification code to remind the recipient to pick up the package; When picking up the package, enter the corresponding information on the terminal, and after the system verifies that it is correct, open the corresponding compartment door. When providing home delivery service, if the customer is unable to pick up the package at the moment, the courier can also place the package in the self pickup cabinet and send a SMS pickup code to inform the customer that the package has arrived. When the customer has time, they can pick up the package from the cabinet themselves, achieving 24-hour self-service. As an emerging mode of express package delivery and pickup on the last mile, it effectively combines online shopping and offline logistics warehousing, not only shortening the delivery time of couriers, but also reducing communication links, and effectively improving delivery efficiency.

Door to door delivery refers to the courier delivering the package directly to the customer and having them sign for it. The length of delivery time, delivery method, and the length of advance notification for delivery will all have a significant impact on the home delivery mode, while sufficient delivery points will shorten delivery time and improve delivery efficiency. Since the number of home deliveries depends on whether the delivery is successful, a successful delivery is the most ideal state for home delivery. Therefore, effective information communication and transmission are the key to improving success. This mode is very convenient for customers, but the delivery time is limited by the customer's schedule. The main representatives of home delivery mode are SF Express, Deppon Express, etc. In the home delivery service model, the courier company needs to arrange a dedicated person to carry out the final step of communication with the end customer. Its characteristic is higher shipping costs, but it can provide faster and more thoughtful services. The characteristics of SF Express are fast transportation speed and strong timeliness. Logistics companies represented by Deppon Express are more popular for their door-to-door services due to the fact that their transported

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goods are mainly large personal consumer goods, making it difficult for individuals to pick them up. There is also a distinction between dedicated personnel and non dedicated personnel (such as freelance couriers providing various temporary express services) in the service mode of home delivery, as well as unmanned mode (such as drone or unmanned vehicle delivery). The unmanned vehicle delivery model is the latest exploration in achieving last mile smart city logistics delivery. It will plan the delivery path based on the destination, complete the loading of goods at the delivery site, and select the optimal route for delivery through big data calculation. After arriving at the destination, it will notify customers by phone or text message. Although there are still some practical problems in the process of popularization and promotion of distribution, this model will become one of the perfect solutions for future urban end logistics distribution with the improvement of modern information technology.

Based on the above analysis, the last mile delivery service can be divided into three types: professional, non professional, and unmanned. Different consumers not only have different preferences for delivery modes and service methods, but also have significant differences in their choices of pick-up/delivery times. Especially the diversification of delivery modes and service methods provides consumers with the possibility of flexibly arranging pickup times. The door-to-door delivery service of e-commerce generally provides several delivery time slots for consumers to choose from, such as 8:00-10:00, 10:00-12:00, 12:00-16:00, and 16:00-18:00. [5]

In 2018, scholars such as Zhu Huiqi [6] conducted an online survey on Chinese consumers in Beijing, Shanghai, Tianjin, Guangdong, Zhejiang, Jiangsu, Shandong, and other cities. A total of 1300 consumer survey questionnaires were collected, of which 1240 were valid, accounting for 95.38% of the total collected questionnaires. The results showed that: (1) from the perspective of delivery mode, 72.82% of consumers chose home delivery, and most of them still prefer professionals to provide home delivery services; 27.18% of consumers would choose to pick up their goods themselves, but the characteristics of their service choices are different from home delivery. More consumers are willing to choose non professionals to provide self pickup services. (2) From the perspective of service mode, 62.66% of consumers choose professional delivery services, especially 52.82% of consumers choose professional home delivery services; 22.42% of consumers are willing to have delivery services provided by non professionals, and their preferences for home delivery by non professionals (11.13%) and self pickup by non professionals (11.29%) are similar; 14.92% of consumers choose unmanned service methods. Overall, consumers are still willing to accept "manned" service methods, and are still in the stage of trying to accept "unmanned" service methods.

4. Problems Faced by End of Line Logistics of Personal Consumer Goods

Firstly, the structural construction and arrangement of distribution nodes are not systematic. Due to the specific requirements of urban and land planning for logistics infrastructure, and the diverse demands of urban logistics distribution and consumers, some large logistics distribution nodes are far away from consumer users. The end logistics distribution nodes are not systematic enough and the connections are not smooth, so information asymmetry between scattered distribution points often occurs. The inability to maximize the utilization of resources, low utilization rates, and high-intensity work at some distribution nodes have led to the localization and decentralization of the entire city's end-to-end logistics distribution network system.

Secondly, there is a lack of information technology and intelligent facilities for distribution equipment, and the popularity of information-based logistics distribution equipment is still low. According to relevant survey statistics, only 10% of enterprises have fully implemented informatization, while logistics enterprises that have partially or already implemented

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informatization account for only 21% [7]of the overall logistics enterprises. Logistics information system refers to an interactive system composed of personnel, equipment, and programs that provides information for logistics managers to execute planning, implementation, control, and other functions[8]. Like logistics operation systems, it is a subsystem of the logistics system. The effective operation of logistics information systems can make the operation of logistics systems more efficient. Through system management, production management informatization, business automation, and real-time information can be achieved, thereby achieving the goal of reducing costs and other aspects. The information asymmetry in the logistics supply chain has led to a sharp increase in logistics costs in many circulation links. The lack of outdated management equipment and intelligent distribution has resulted in delayed logistics information processing, frequent incidents of cargo damage, and low consumer satisfaction ratings, all of which pose great challenges to urban end of pipe logistics distribution.

The third problem is that the existing delivery model cannot balance logistics costs, efficiency, and quality. Delivery is one of the most important links in logistics activities, and its quality and efficiency determine the quality and efficiency of the entire logistics system. How to effectively manage and control logistics distribution is a very important link in logistics activities and the key to improving the efficiency of logistics systems. Therefore, it is very important to establish a reasonable and feasible efficient logistics distribution system. The current 'last mile' delivery model is joint delivery. The core idea is that once the goods enter the destination city, logistics will no longer distribute them separately. Instead, it is achieved through the relevant personnel at the end of the line to achieve unified delivery and organize the goods to be delivered, thereby reducing the cost of logistics transportation. As a pilot project area for joint delivery in Beijing, we collaborate with various express delivery companies to achieve consolidation of end of pipe delivery and optimization of overall resource allocation. This is the same as customers going to the pickup point to pick up the package themselves, but it cuts off the link for logistics companies to directly contact the end customer, resulting in difficulties in obtaining customer feedback and losing customers. At present, the delivery situation of the "last mile" in China is not ideal, which can be attributed to two main aspects: the low quality of delivery services. The delivery service quality is poor. Mainly manifested in three aspects. One issue is that the delivery of goods is not timely enough. The courier cannot deliver the goods to the customer within the specified time; Secondly, the delivered goods are damaged. The third issue is the poor service attitude of the courier.

Finally, there is the issue of low logistics operational efficiency. Due to the rapid development of modern economy and increasingly fierce market competition, customers have higher and higher demands for products and services, requiring logistics companies to continuously reduce transportation costs and control logistics costs to the lowest possible level. Therefore, improving delivery technology and increasing delivery efficiency is one of the most effective ways for modern enterprises to reduce logistics costs. At present, the most researched topics by scholars both domestically and internationally are: timely on-site service according to customer requirements; Optimize transportation routes based on customer demand and product quality; Manage and control the distribution center according to transportation needs. A small issue can lead to production and delivery delays. When customers complain about slow order processing, it is usually due to the company's failure to incorporate a correct, effective, and timely order processing system into its workflow. This will result in production process interruptions, extended production cycles, and unnecessary losses due to delayed delivery times; Or the order may be cancelled because they do not have enough processing power to deal with this issue.

And the imperfect delivery system has caused the problem of low efficiency in the "last mile" transportation. In cities, transportation mainly relies on vehicles such as cars and tricycles.

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With the growth of urban population, the increase of traffic flow, the increase of car ownership, and the worsening of motor vehicle emissions pollution, urban traffic congestion is becoming increasingly severe, especially near the entrances and exits of highways where traffic queues often occur. At the same time, it has also brought great difficulties to delivery.

5. Solutions

5.1. Unify the planning of distribution nodes.

As an industry with great development prospects for cities in the future, express delivery inevitably needs to be controlled by the government and planning departments in its early stages of development. By establishing a separate express delivery planning department to serve urban express delivery, the land used for the development of express delivery should be reasonably divided and planned to ensure its healthy development in the city while promoting the rational development of the entire city. An independent department dedicated to the development of urban express delivery shall be established within the subordinate agencies of the planning department, specifically responsible for the planning of urban express delivery. This department is responsible for the land use of urban express delivery, the selection and quantity of distribution centers and service outlets, as well as the long-term planning of the urban express delivery industry. This can ensure the rationalization of service network layout and promote the sustainable development of the entire urban industry. When planning, divide the city into multiple areas through communities or distance, select reasonable and well-equipped locations to set up storage points, and at this time, the storage points are equivalent to logistics transfer stations, which can effectively reduce transportation time and improve distribution efficiency. To make rational use of resources, storage points can be established in supermarkets with basic storage equipment, and storage points with complete facilities can also be re established, but the investment cost is relatively high.

5.2. Strive to achieve intelligent and convenient logistics distribution at the end of the city.

Reasonably use modern advanced information technologies such as the Internet, big data, cloud storage and GPS to continuously improve the intelligent and scientific level of urban end logistics. Applying drones, unmanned vehicles, and intelligent robots to the field of urban logistics distribution aims to reduce the cost of urban logistics distribution, shorten delivery time, improve delivery accuracy and efficiency.

5.3. Promote the establishment of a shared urban distribution model and accelerate the construction of public intelligent facilities for the "last mile".

Continuously improving the joint distribution network of urban terminal logistics. After arranging the detailed logistics nodes, it is necessary to plan the urban logistics dedicated sites uniformly, sort out the transportation routes of urban logistics distribution vehicles, and provide corresponding special subsidies and financial support to logistics enterprises that implement joint distribution and public distribution, so as to make the urban joint distribution model increasingly complete.

6. Conclusion

At present, the "last mile" of personal consumer goods logistics has become a bottleneck for improving the online shopping experience, and its service quality cannot meet the needs of consumers. This article first introduces the characteristics of personal consumer goods logistics, then introduces several current models of personal consumer goods end of pipe logistics,

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analyzes the existing problems, and provides suggestions for promoting the improvement and development of personal consumer goods end of pipe logistics.

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