

Research on Current Application of Intelligent Express Cabinet and Its Development Countermeasure*

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Abstract—As an effective operation mode in terminal delivery, intelligent express cabinets have been widely distributed in end delivery areas such as universities, communities, and office buildings, which facilitate the delivery of the last mile of express delivery. This article analyzes the application situation and existing problems of existing intelligent express cabinets, and puts forward countermeasures for future development from the aspects of differentiated delivery and selection of express cabinets, the size and quantity ratio of cargo boxes, and the provision of multifunctional value-added services.

Keywords—*intelligent express cabinet; use efficiency; development countermeasures*

I. INTRODUCTION

In recent years, the number of express packages in China has grown rapidly. In 2018, the number of packages in circulation in China exceeded 50 billion, an increase of about 10 billion over the previous year, and the increase was close to the total volume of packages in the United States for the entire year. According to the statistics of the “Analysis Report on the Development Trend and Investment Planning of China’s Express Delivery Industry” released by the Foresight Industry Research Institute, China’s express delivery business volume in 2010 reached only 2.34 billion. Since the “Thirteenth Five-Year Plan”, China’s express delivery industry has maintained rapid growth, with an annual business volume of 10 billion. Since 2014, China’s express delivery business has ranked first in the world for 5 consecutive years, exceeding the combined business volume of developed economies such as the United States, Japan, and Europe. As of 2018, the business volume of express delivery service enterprises in China has completed 50.71 billion pieces, a year-on-year increase of 26.6%. The accumulated business income was 603.84 billion yuan, a year-on-year increase of 21.8%. It has ranked first in the world for 4 consecutive years, with annual business volume accounting for more than 45% of the world’s total, and contributing more than half of the world’s express delivery growth; revenue from express delivery business reached

495.71 billion yuan, an increase of 24.7% year-on-year.

By the end of 2018, the number of express shipments per capita was 36, an increase of 7 from the previous year. The average daily delivery service of courier companies is 280 million person-times, which is equivalent to 1 out of 5 people using courier services every day. Express delivery has become an integral part of modern production and life. The number of new job creations in the express delivery industry exceeds 200,000, contributing more than 2% to domestic job creation. In 2018, the number of urban public courier service stations and that of rural public pick-up and drop-off points reached 71,000 and 67,000 respectively. The standardization rate of major direct outlets in express delivery enterprises in urban areas exceeded 92.7%, an increase of 10 percentage points from the end of the previous year. The number of intelligent express cabinets put into operation by major enterprises reached 272,000, with an increase of nearly 70,000. The delivery rate of express boxes reached 8.6%, an increase of 1.6 percentage points, and the delivery efficiency improved significantly. On average, there are 1.5 express delivery shops per 10,000 people and 2.2 delivery points per 100 square kilometers. The degree of facilitation of the “last mile” has continued to increase, and 199 cities have introduced policies for managing end-service vehicles for express delivery, with a coverage rate of 60%. This has formed a new pattern of end-delivery services in which multiple modes such as residential delivery, intelligent express box delivery and public service station delivery complement each other.

II. MAIN PROBLEMS IN THE APPLICATION OF INTELLIGENT EXPRESS CABINETS

Nowadays, it has become a common phenomenon to send items through express cabinets. This also better solves the problem of the “last mile” in logistics and distribution, which facilitates people to pick up pieces and improves people’s quality of life, but there are also some problems.

A. *The Function Is Relatively Single and Cannot Meet the Needs of Different Customers*

The development of express cabinets is mainly to improve the efficiency of sending and receiving express for

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the users, and to solve the problem of failure to receive express delivery in time. There are many forms of terminal delivery for express delivery. Relying on the single pick-up function of the express delivery cabinet does not have strong appeal and competitiveness. At the same time, it is not interesting for customers. If the express cabinet wants to survive, it must first have a certain passenger flow to maintain its normal operation. At present, customers using express cabinets are only part of the online shopping community, so other functions of express cabinets need to be added.

B. The Cost of Placing Intelligent Express Cabinets in the Community Is High

There are many scales, types, densities, and grades of Chinese residents' communities, and their management methods are different. Therefore, it is difficult to put intelligent express cabinets in the community. The biggest resistance to the launch of express cabinets in the community comes from the property. To put intelligent express cabinets in the community requires an entry fee. At present, there is no uniform standard for this fee, but it is determined by the community property itself. At present, the entrance fee charged by the property ranges from several thousand to tens of thousands. This is a huge expense for the express cabinet industry that is still at a loss. It can also be said that high thresholds have blocked the construction of intelligent express cabinets in the community. At present, the launch of many community express cabinets still has the property as the dominant position, and it is difficult for the launching company to bypass the property to complete this matter.

C. The Difference in the Efficiency of Using Express Cabinets in Different Regions Is Obvious

1) The use efficiency of express cabinets in universities is high: The number of college students is high and intensive. Many students shop online more frequently, and the number of students who place orders every day is higher. Therefore, the number of single-day express delivery in colleges is much higher than that in residential communities. College student groups like to accept and try new things. At the beginning of express delivery cabinets in colleges, many students started using them after a brief understanding, so there was no break-in period and adaptation period. The two factors of large express traffic and students' willingness to use directly lead to the use of the colleges intelligent express cabinet is much higher than the use efficiency of the residential community. Many colleges intelligent express cabinets have higher than 2 turnovers per day, while community express smart cabinets have a turnover rate of up to 1 per day, and even a considerable percentage of the cabinets are vacant for a long time.

2) The community's use of express cabinets is relatively low: The composition of online shopping consumer groups in Chinese residents' communities is complex. The size, grade, living density, and resident population of the community will affect the type and quantity of online

shopping orders in this area. Moreover, the mobility of personnel in some communities is great, and it is difficult to accurately predict the number of online shopping orders in a certain community in a certain period. There are three main reasons for the low efficiency of community express cabinets. First, the number of community express delivery has decreased significantly compared with colleges. Second, community residents are accustomed to home delivery, and this habit is difficult to change in the short term. Third, the location of intelligent express cabinets in some large communities is relatively remote. If not by the way, many residents are reluctant to spend time to pick up the courier in the express box, preferring to wait for delivery at home. These factors have directly caused the daily turnover rate of the express cabinets in the community to be less than one, the use efficiency is low, and is much lower than that of college express cabinets.

D. The Size Design and Quantity Ratio of the Express Cabinet Are Unreasonable

An investigation was made on a kind of courier cabinet that is available and commonly used in some communities, and the length, width and thickness of the cabinet were measured. If it is a intelligent express cabinet of the same brand, their sizes are basically the same. Intelligent express cabinets also design cabinet sizes according to the needs of express parts. The largest and smallest sizes have the smallest number of cabinets, and the medium-sized cabinets have the largest number. This shows that there are fewer oversized or extra small courier items, which are generally medium-sized courier items. The currently commonly used intelligent express cabinets are generally classified into four storage cabinets: 6 cabinets of the largest size (42cm * 40cm), 22 medium-sized cabinets (42cm * 22cm), 22 long-shaped cabinets (42cm * 10.5cm), and 12 cabinets of the smallest size (25cm * 10.5cm). The thickness of the cabinet is 55cm. The total number of intelligent express cabinets is 62. After calculation through these data, the storage space size (length * width * thickness) of the cabinet is arranged from large to small according to the cabinet space, which are 92.4 cubic meters, 50.82 cubic meters, 24.255 cubic meters, and 14.44375 cubic meters.

III. COUNTERMEASURES TO IMPROVE THE EFFICIENCY AND SATISFACTION OF INTELLIGENT EXPRESS CABINETS

A. Optimizing the Location of Intelligent Express Cabinets

The scientific and reasonable location and layout of intelligent express cabinets is conducive to the promotion of the express cabinets and the improvement of the use efficiency. The express cabinets of colleges can be selected in locations with large traffic flows such as teaching areas, dormitory areas, or in the must-go places of daily commuting routes such as students taking classes, leaving classes, going to the cafeteria, and going to the library. This all helps to increase the turnover of express cabinets. Because of the variety of communities, small communities can choose the entrance of the community, while large and medium-sized

communities need to carefully consider site selection according to the community area plan. If the location is remote, the use efficiency of express cabinets will be greatly reduced, so it can choose to set multiple courier cabinets in more than two locations, which is convenient for more residents.

B. Improving the Ratio of the Size of the Opening of the Intelligent Express Cabinet

At present, the size of the cabinet openings of intelligent express cabinets on the market is basically divided into three specifications, large, medium and small, with a number ranging from dozens. However, the consumption characteristics of colleges and communities are different, and the types and sizes of online shopping products are also different. The number and proportion of express cabinets should be improved according to the characteristics of online shopping consumption in this area. The number of online purchases in colleges is huge, with small parcels accounting for a high proportion. Therefore, the intelligent express cabinets of colleges should be equipped with a large number of small and medium cabinets, and the proportion of large cabinets should be appropriately reduced to meet the needs of express delivery of small pieces of clothing, shoes, hats, cosmetics, and digital products. According to the characteristics of online shopping in the community, intelligent express cabinets should increase the proportion of medium and large cabinets, and increase the number of refrigerating freezing cabinets to meet the increasing demand for online fresh food purchases in the community.

C. Providing Multi-functional Services and Developing Value-added Services

In order to improve the space utilization rate of intelligent express cabinets and provide users with more residential services, a series of extended function designs have been made for express cabinets in the "Internet +" environment. There are already mature express cabinets on the market today. For example, services can be selected through the smart terminal of express cabinets. Generally, the services provided are based on the intelligent terminal of express cabinets, with "Internet +" as the support to provide some online booking, offline door-to-door service. Some existing smart terminals in express cabinets can provide services such as booking car wash and laundry. In addition, can roadside newspaper kiosks, vending beverage machines and other daily facilities be combined with intelligent express cabinets to make intelligent express cabinets multifunctional and provide more and more convenient living services? For the different attributes of logistics items, the equipment and technology used are also different, and the end logistics service products can be divided into "normal temperature" and "low temperature". For "low temperature" products, the cold chain mode is adopted, and compression refrigeration equipment is installed to provide "low temperature" environment for short-term storage.

D. Intelligent Express Cabinets Should Work on Reverse Logistics

As we all know, the profit of the express delivery industry is mainly concentrated in the shipping, and new profit points should be found through the shipping end to meet the requirements of users to send at any time. The proportion of college students who buy clothing, shoes and hats online is the largest. But at the same time, clothing, shoes and hats are also the category with the highest return rate on the Taobao platform, with individual stores even reaching 50%. Daily express packages in colleges are huge, and there are a lot of returned goods. It is recommended to pay more attention to the shipping channels to generate more profits. The online shopping products in the community are diversified, and the sending function of the community intelligent express cabinets needs to be further improved. Express cabinets manufacturers should design more convenient procedures and links to make it easier and more convenient for residents to send, so as to gradually cultivate the daily sending habits of community residents using intelligent express cabinets. For security and privacy requirements, some users will slowly change the habit of sitting at home waiting for the courier to pick up the goods, and slowly accept self-delivery at the intelligent express cabinet site within 10 minutes of walking.

IV. CONCLUSION

Since being put into use in 2013, the intelligent express cabinet has quietly integrated into people's lives and has become a part of people's lives. It allows users to feel the humanity of logistics and distribution. It turns out that express delivery can also become a convenient thing. There is no need to be bound by the time of express delivery, and people can arrange their time more flexibly. Currently, the rate of courier into the express cabinet is only 2% to 4%, that is, only 2% to 4% of the over 50 billion couriers in the year are received by express cabinets. China has entered the normal state of daily express delivery volume exceeding 100 million pieces, and according to the "13th Five-Year Plan", by 2020, this proportion will reach 10%. The market potential of express cabinets is huge. In the next few years, the rate of courier into the express cabinet will increase from 2% to 10%. This is not only an increase in the number of proportions, but a geometric increase in the absolute number of express delivery. To achieve this goal, it requires the efforts of express cabinet companies, express enterprises, couriers, users, and even university management departments, office buildings properties, community properties, and governments. Only in this way can intelligent express cabinet become an effective element of smart cities and smart logistics.

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