

## STUDY ON THE DISTRIBUTION PATTERN OF URBAN SMALL LOGISTICS DISPENSE FACILITIES OF CHINA UNDER INTERNET ECONOMY BACKGROUND

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### ABSTRACT

Small logistics dispense facilities (SLDFs) were emerging urban public facilities with the development of Internet economy in China. SLDFs provided storage, classification, transportation and distribution services for package and takeaway goods to people. This study took Shanghai, China as a case, hoping to obtain the basic information of SLDFs in this area. The distribution and operation status of them were the main study content. In addition, this paper was going to collect the residents' view on these facilities. The (point of interest) POI data of SLDFs distribution information was downloaded from Google Maps. The demographic data was collected from the Shanghai Public Data Open Platform. The data of categories and size of SLDFs, and the residents' opinions about them was collected from the field investigation. The results showed that the distribution of SLDFs in Shanghai had an obvious clustered distribution phenomenon. The distribution of SLDFs had a great correlation with the total population of the region, but has little correlation with the population density. There were problems such as poor service quality, noise, and fire risks in the SLDFs were concerned by residents. Therefore, more targeted scientific space planning and management control measures were needed to adopt for them. Key words: small logistics dispense facilities, distribution pattern, internet economy, China.

### INTRODUCTION

Logistics services has become the main content of supply chain management and e-commerce, it is also an important index in measuring the level of social development. SLDFs are set by express company to solve the last 1 kilometer of distribute goods (Fig. 1). They provided storage, classification, transportation and distribution services for package and takeaway goods to people. So that, they were the closest link to residents in the logistics supply chain and reshaped the connection between residents and businessmen. Because of SLDFs only needed a small space and simple function, they developed rapidly in cities. But the low profits made they grew in the narrow space (Fig. 2).

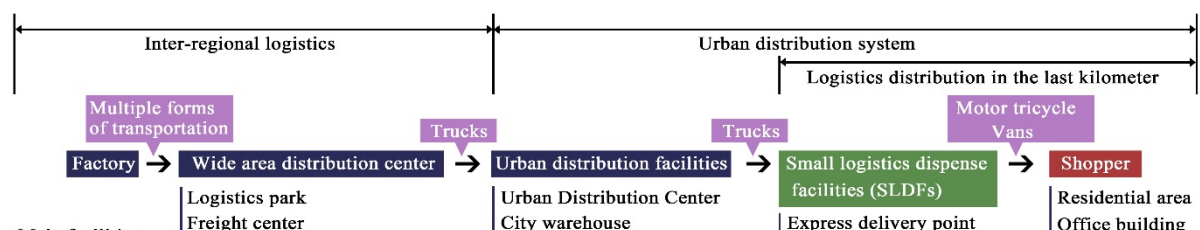


Figure 1. Structure of urban delivery network of China

This paper took Shanghai as an example, the location, dimension, and distribution information of SLDFs was collected based on field investigation and network survey. The results showed that the

distribution of SLDFs had an obvious correlation with the distribution of urban population and the economic level, which means that they could reflect the development condition of an area. But



Figure 2. Outward and internal view of a small logistics dispense facility

neglects from related departments made SLDFs faced with a lot of problems, such as noise, fire risks, pollution, and poor service. How to improve the service quality of SLDFs and optimize they location planning became an urgent need.

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## BACKGROUND

People's living habits and consumption patterns has been changed with the rose of online shopping for 21 centuries. There were many researches on logistics facilities location and distribution pattern. Four metropolitan areas of California were taken as the research objects to explore the spatial pattern and influencing factors of logistics industry distribution by Genevieve Giuliano and Kang Sang Gyun (Giuliano and Sang, 2018). The deployment of pickup points in urban and suburban areas in French was studied by Eleonora Morganti (Morganti, 2014, p.23). The location of urban logistics facilities in Gothenburg, Sweden was investigated by Adeline Heitz (Heitz, 2018, p.248). The locations of logistics service providers in Germany under a new freight transport generation model has been studied by Kevin Rolko and Hanno Friedrich (Rolko and Friedrich, 2017). These studies showed that there was a correlation between the distribution of pickup point and the urban development condition.

The problems of the current pickup points planning and its layout in Nanjing, China were studied from the perspective of residents in decision making behavior by Rushi Tan (Rushi, 2016). Based on POI data of Cainiao station and China post from Xi'an, Cainiao station's dependent organization relationship with the China Post has been studied by Gang Li (Gang, et al. 2018). The economic and social information such as managing types and service subjects of Cainiao stations were explored based on POI data and GIS tools by Jiao Zhou (Jiao, et al. 2019). Cainiao station was a representative small logistics dispense facility in China. These studies showed that a reasonable planning was needed for pickup points in China, meanwhile, these facilities could be used as an indicator to predict the development of urbanization and social economy development.

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## METHODOLOGY

This study wants to find the distribution pattern of SLDFs in Shanghai, as well as the types and service situation of SLDFs. The scope of research includes 16 administrative districts, such as Huangpu District, Pudong New District. This paper was divided into 2 parts, the 1<sup>st</sup> part was to explore the distribution characteristics of SLDFs in Shanghai, including its spatial layout, types,

quantity, and density. The 2<sup>nd</sup> part was to investigate problems of SLDFs and its impact on the city and residents.

The point of interest (POI) data of SLDFs distribution information was downloaded from Google Maps. The results showed that, there were more than 3226 SLDFs in Shanghai, and their name, geographical location was collected. The distribution information of SLDFs could be display intuitively by using Geographic Information System (GIS). The demographic data in urban area was collected from Shanghai Statistical Yearbook (Shanghai Municipal Statistics, 2019), it showed that there were more than 24.84million people lived in the urban area. The relationship between SLDFs and the number and density of people in Shanghai will be find by comparing these data.

An investigation for SLDFs was carried out in a form of conversation. Information about storage area, service radius, service hours and space types of them was collected. A simple questionnaire about SLDFs was created to get whether the distribution of SLDFs meets the needs of residents. There were 5 questions in this questionnaire, and there are five indicators for each question. From 0 to 4, they were very dissatisfied, dissatisfied, General, satisfied, very satisfied.

1. Are you satisfied with the number of SLDFs in your residential area?
2. Are you satisfied with the distance to go to SLDFs in your residential area?
3. Are you satisfied with the service of SLDFs in your residential area?
4. Are you satisfied with the noise was made by SLDFs in your residential area?
5. Are you satisfied with the security performance of SLDFs?

The questionnaires were conducted in Yangpu District. 195 valid samples are collected out of 200 with effective return-ratio 97.5% in one months. The respondents were those who were about to pick up their parcels.

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## FINDINGS

The geographic information of SLDFs was visualized by using ArcGIS software. The result showed that there were significant differences in the number and distribution of different types of SLDFs in Shanghai. The distribution of three types of SLDFs (Cainiao station, SF Express and Express Mail Service) were shown in Fig. 3. The distribution of different facilities was different, but, the pattern of central agglomeration and surrounding dispersion was shown in all kinds of SLDFs. Obviously, this distribution character is related to the population distribution of Shanghai.

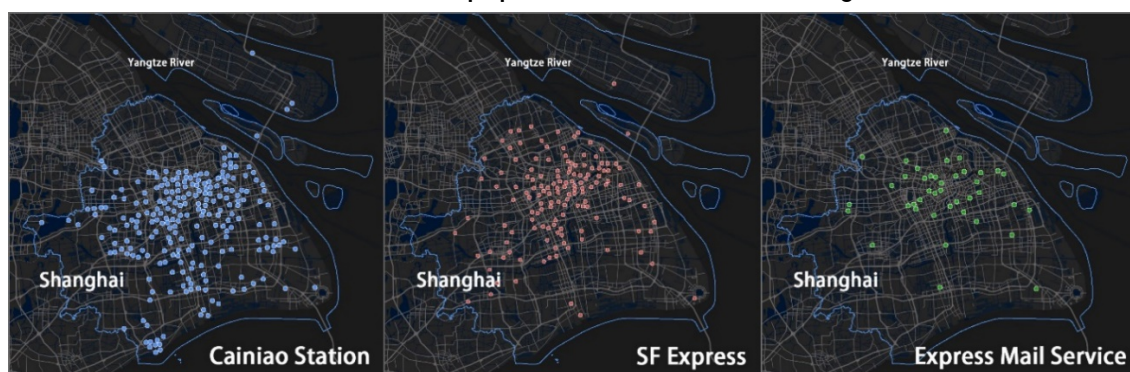
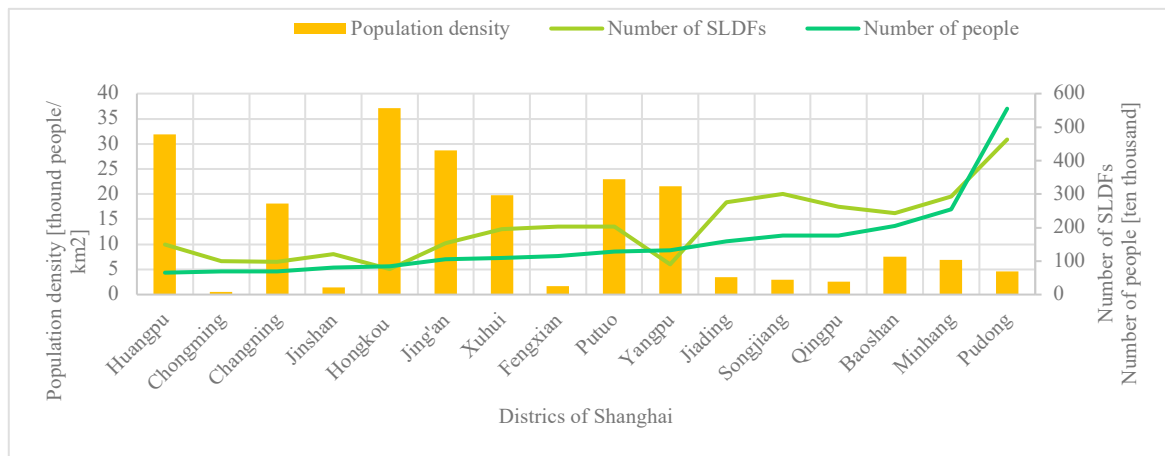









Figure 3. The distribution map of three SLDFs in Shanghai

The correlation between the number of SLDFs and the number and density of population were funded by comparing these three data. The results showed that the distribution number of SLDFs



**Figure 4. The correlation between the number of SLDFs and the Number and density of people in Shanghai.** had a great correlation with the total population of the administrative region, but has little correlation with the population density (Fig. 4).

Based on the sample survey of SLDFs in Shanghai, this paper divided SLDFs into 7 categories according to their dimensions, mode of operation, service radius and objects. The results were show in Fig. 5. The individual store was the was the largest number of SLDFs, they were main distributed along the street like ordinary shops. A questionnaire about the service quality of them were conducted.

Categories	Newsstand	Individual store	Residential district property	Campus pickup point	Express company	Chain store	Self-service cabinet
Definition	A newsstand provides service of sending and receiving express	A personal store, often located in a residential area	A property company provide express service for residents	A pickup point located in a campus	A pickup point is set up by express company	Large chain stores with legal business license	An automatic cabinet for receiving express
Appearance							
Storage area	>1m <sup>2</sup>	>2m <sup>2</sup>	>2m <sup>2</sup>	>5m <sup>2</sup>	>10m <sup>2</sup>	>10m <sup>2</sup>	Flexible space
Service radius	<400m	<600m	Residential area	Campus area	<1 Km		<600m
Service hours	>14 hours						24 hours
Space types	semi enclosed space	semi enclosed space	enclosed space				open space

**Figure 5. The distribution pattern of SLDFs in Shanghai**

Investigations showed that, in Yangpu District, Shanghai, China. More than half of the respondents were feeling was generally about the number of SLDFs in their residential area, about 24% of them felt satisfied with the number of SLDFs. This result showed that the number of SLDFs in Yangpu District could meet the need of most of the residents. There were about 45% of the respondents were feeling was generally about the distance to go to SLDFs in their residential area, about 30% people felt dissatisfied about that, because the walking distance was too long. There were about 47% of the respondents felt dissatisfied about the service of SLDFs the main reason of dissatisfied was the bad service attitude of the staff. 33% of them were feeling was generally about the service quality, although they thought the service attitude of staffs was not good, it was acceptable. There were about 45% of the respondents thought that the noise of SLDFs had affected their lives, especially the noise of loading and unloading goods in the early morning and at night. There were 35% of residents believed that the SLDFs represent fire hazards and other security risks. According to the survey, most of the SLDFs were not equipped with any fire prevention facilities.

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## CONCLUSIONS

The distribution pattern of existing SLDFs showed that the spatial layout of pickup points had a market-based orientation, because they were planned by e-commerce enterprises. The character of space structure of SLDFs was:

1. The distribution of SLDFs in Shanghai had an obvious clustered distribution phenomenon. As a service facility, aggregation led to inefficient competition.
2. The distribution of SLDFs had a great correlation with the total population of the region, but has little correlation with the population density.
3. There were 7 kinds of SLDFs in Shanghai, they had different service radius, service hours, and the need of storage area and space types were also different.
4. At present, the main mode of development of SLDFs was attach on a private shop, which led to the poor service quality. The cooperation threshold of SLDFs was low, which provides convenience for businesses, but on the other hand, it also weakened the service quality.

Major express companies and e-commerce enterprises have joined the ranks of building pickup point space, with the rapid promotion and development of SLDFs. The spatial distribution of SLDFs based on market thinking could not fully applicable to the residents' modern living habits. Because it gradually became a facility had the public service attribute. In addition to the government's intervention, the construction and layout planning of SLDFs space needed to be systematically integrated as a new public service space for residents. The construction of SLDFs could not only consider the minimum of space and time cost, but consider the living needs of residents.

E-commerce has come to a business-to-business (B2B) 4.0 era with popularization and rapid development of Internet. SLDFs play an increasingly important role in the city, effective managements of SLDFs will help to enhance the vitality of the city, elevate the quality of the city, and improve the online shopping experience of residents. Some suggestions are given as follow to promote the service quality of SLDFs:

- 1 The necessity of SLDFs in urban planning should be considered. Relevant design standards should be formulated to guide its layout and construction.
- 2 Stronger operational supervision should be taken to improve its service quality. For example, its fire-fighting facilities should be regularly inspected. Its operating hours should be adjusted to daytime rather than in the early morning or evening.

3 The function of SLDFs should be enhanced and updated to deal with other problems that may arise in the city. The relevant departments should pay more attention to the changes of urban space under Internet economy background.

4 Facility staff should be trained and assessed to improve the service quality of SLDFs.

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