

Bussiness Model Analysis of Crowd Logistics in China

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Abstract

The rapid development of e-commerce has made urban logistics activities increasingly frequent, and how to optimize the last-mile delivery has become a new topic. In order to reduce logistics costs and improve distribution efficiency, enterprises have used crowd logistics to carry out delivery activities. In China, which has the largest e-commerce market, the development of crowd logistics has begun to take shape. In order to understand the business model of China's crowd logistics enterprises and the opportunities and challenges facing in the future, this paper selects three representative Chinese enterprises, uses the methods of case study and business model canvas, through information platform, interviews with the managers to collect data and analyze business models in depth. By the comparison with traditional logistics, this paper summarizes the characteristics and advantages of China's crowd logistics, and further proposes the implications for crowd logistics practice and research.

Keywords

Crowd logistics, business model, last-mile delivery, sharing economy, case study.

1. Introduction

Information and communication technology (ICT) has promoted the rapid development of e-commerce. According to statistics, from 2014 to 2018, global retail e-commerce sales increased from \$ 1.336 trillion to \$ 2.842 trillion, an increase of 113%[1], E -Marketer estimates that this number will continue to grow to \$ 3.563 trillion in 2019. As the largest market for e-commerce, China's e-commerce retails sales will increase by more than 30% to nearly \$ 2 trillion in 2019, more than half of the total global sales [2]. The development of e-commerce is accompanied by an increase in urban logistics and distribution activities, such as last-mile delivery. In addition, customers are increasingly demanding for the timeliness and innovative of logistics services.[3] Demand of logistics service not only brings high distribution costs[4], but also negatively affects society and the ecological environment, such as greenhouse gas emissions, air pollution, road safety hazards, and traffic congestion issues [5]

In order to solve these problems, many e-commerce companies and logistics distribution service providers have tried to use "crowd logistics" to develop urban distribution business. Crowd logistics means that enterprises outsource logistics operations to the general public and uses its human resources (crowdsourcing-based logistics) to carry out logistics activities and provide logistics services to customers[6]. In June 2015, Amazon announced that they are using crowdsourcing logistics to launch the last mile delivery activities[7]; UPS uses crowd logistics to provide customers with "same day delivery"services; In April 2016, Jingdong 's O2O subsidiary "Jingdong Daojia" merged with "Dada" to form a new company "Dada-Jingdong Daojia", use crowd logistics to provide users with same-city express services and new retail services; Chinese e-commerce giant Alibaba Group has also involved in crowd logistics:got local O2O platform-eleme in April 2018; Cainiao Network Invests in Real-Time

Logistics Platform "Dian Wo Da" with 290 million. In the time of affecting the business model of e-commerce and logistics service companies, crowd logistics also spawns a number of startups: Uber, involved in logistics after the success of the taxi industry, UberEats provides food delivery and UberRush provides same-day delivery service for online shopping customers; Deliv recruits the general public to provide faster and cheaper delivery to customers in retail stores[6]; These phenomena show that "crowd logistics" has been an extremely important issue in the logistics industry and has aroused great interests from related companies. Although the "crowd logistics" practices are very common, a review of the literature reveals that academic research on "crowdsourced logistics" is very limited. This means that the business model of crowd logistics has not been fully studied. For solving the problem, this paper obtains a large number of multi-dimensional data from three crowd logistics companies, and then studies the business model of Chinese crowd logistics. The aim is to provide experience for start-ups to establish sound business models; to help practitioners reshape their existing business models to adapt to the current logistics industry development trends.

2. Crowd Logistics

Crowdsourcing logistics means the application of crowdsourcing in the logistics industry. "Crowdsourcing was proposed by Howe. It is a compound word derived from "crowd" and "outsourcing"[8]. Although there are different definitions, there is consensus on the understanding of crowd logistics: crowd logistics is companies or individuals use information platform to outsource logistics activities to some general public or organizations[9][5]. Since crowdsourcing logistics is essentially a kind of sharing economy[10], The industry also calls crowdsourcing logistics sharing logistics. Considering the characteristics of the research object, and for the convenience of readers, this article will use "crowd logistics" to describe the logistics business. Compared with traditional logistics, crowd logistics has differences in the terms of strategic, organizational, and operational levels, Crowd logistics can be divided into four categories based on the nature of the services they provide: crowd storage, crowd local delivery, crowd freight shipping, crowd freight forwarding[6]. Considering the scale and effect of practical applications, the crowd logistics in this article refers more to crowd distribution. Crowdsourcing logistics has been widely used in the last mile delivery. Vincent et al. Proposed an effective large-scale mobile crowd-tasking model for last mile delivery, Comprehensive experiments on the Singapore and Beijing datasets show that using crowd logistics to optimize the last-mile real-time delivery utility can effectively reduce distribution costs, improve distribution efficiency and customer satisfaction[11], and effectively reduce the "multiple delivery" phenomenon in the last mile delivery[12]. Due to its own characteristics, crowd logistics also has some defects in terms of safety and property, in order to promote the sustainable development of crowd logistics, reduce costs and increase efficiency of the logistics industry, effective measures must be taken. For example, use social networks to provide delivery services in order to protect users' privacy and solve some security issues[14]. The urban distribution market has spawned many crowd logistics companies, study on the business models of these companies can show the operating model and development status of crowd logistics companies[11]. At present, the main method used to study the business model of crowd logistics are case studies, which collecting multidimensional data from the Internet platform and interviews with senior leadership through interviews[10]. The development of Crowd logistics is still under exploration. Compared with traditional commercial logistics, crowd logistics has its inherent advantages[9][14]. But it also faces challenges and opportunities from various aspects of society, economy, environment, etc[5]. Enterprise positioning and future development trends are also worth thinking about[6].

3. Methodology

3.1. Case Study

Considering that “crowds logistics” just appeared and its operation model is relatively advanced, so this article adopt the case study method. Case study can deeply analysis the operation mode of companies in real world[15], solve the problems of limited empirical data and incomplete theoretical framework in the field of crowd logistics, and reveal the essential characteristics of crowd logistics through the operation level, providing a basis for future research and theoretical development.

3.2. Data

The data collection process of this article is mainly divided into three steps: First, extensively collect basic information about crowd logistics companies in China mainland and classify them according to their industry and main activities; Secondly, formulate selection criteria and screen target companies, and then target the research objects to three companies; finally, collect data through multiple channels to conduct in-depth analysis of the target company based on the business model canvas.

The status quo of crowdsourced logistics development has brought some difficulties to sample selection: Crowd logistics have developed rapidly for some time, with a large number but homogeneous services; some companies are still in the trial and error stage; some companies nearing bankruptcy; and there is part of companies have closed. So the selection criteria of this sample are follow: 1. The "age" of the enterprise can not less than three years; 2. The company plays a key role in the development of the crowd logistics industry; 3. There are lots of users in the platform and the brand is famous in a degree. As mentioned before, crowd logistics must have the information platform. As the user's trading channel, it generates massive, heterogeneous, and multidimensional data at all times. Therefore, this article takes the information platform (website, APP) as the main way of data collection. Using the information platform can easily obtain some data, and the results based on it are reliable, which avoiding the bias caused by literature review[16]. In order to have a deeper understanding about the company's strategic and operation process, we interviewed a senior executive of crowd freight company in Taiwan and communicated with the crowd of five crowd logistics companies to understand the working conditions and the operation mechanism. We also collect some data from the published journals, literature, magazines, and news reports, in order to obtain more comprehensive and objective data from all angles.

3.3. Business Model Canvas

In order to present the existing business model of the crowd logistics more clearly, we use the business model canvas to systematically organize and analyze the data. The business model canvas was first proposed by Alexander Osterwalder and Yves Pigneur in 2010. It is a visual chart composed of nine modules that describe customer segment, value proposition, key activities, infrastructure and finance and some other elements[17]. Applying the business model canvas enables this article to look at how the business works from a holistic, systemic perspective, rather than scattered, unrelated activities [18]. Because of its unique advantages, companies like Ericsson, IBM, and Deloitte are using the business model canvas to evaluate and optimize their business models [17]. we could achieve the following goals through it[19]:

- Clarify the value proposition of the company;
- Analysis of the company's market segment and its main partners;
- Kown about company's cost and revenue;
- Describe the role of the enterprise in the network;

- Develop a company's competitive strategy by analyzing the company's main partners and key resources;
- Compare the similarities and differences of business models between crowd logistics companies;
- Analyze the characteristics and development trend by comparing with traditional logistics.

4. Results

Based on a comprehensive review, we select three companies: "Renren Delivery", "Dada-Jingdong Home" and "Eleme-Fengniao Delivery".

4.1. Research Object

(1) Renren Delivery

Renren Delivery Founded in 2013, the founder was inspired by the life scene and combined the logistics business with the Internet to create an information platform that serves the urban logistics. The emergence of Renren Delivery fills the market gap for the rapid goods delivery in the same city. As the first and largest direct delivery platform in the same city in China, Renren Delivery combines the mobile Internet and "crowd", based on the platform and safety guarantee, we use the general public to provide customers with one-by-one services such as purchasing, and delivery. See in Fig.1:

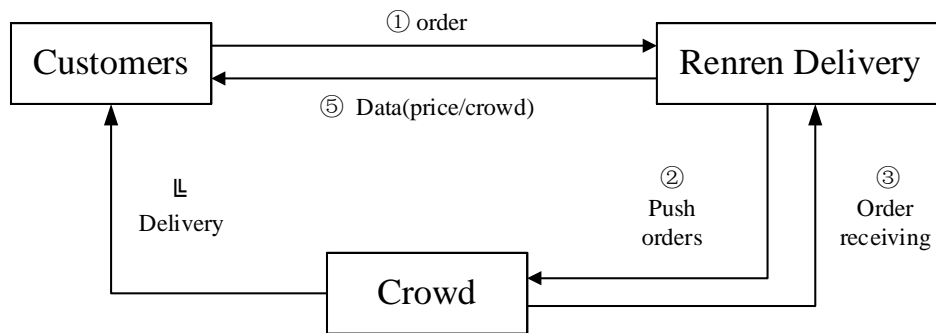


Fig. 1 Renren Delicery Flow Chart

(2) Dada-Jingdong Home

Dada-Jingdong Daojia is composed by "Dada" Instant Delivery Platform and "Jingdong Home" O2O Fresh supermarket platform. Its main business is the "service for O2O consumption scenario" distribution activity, which means that distribution resources originally owned by Dada platform are now mainly used to perform the delivery activities of JD Home O2O consumption business. See Fig.2

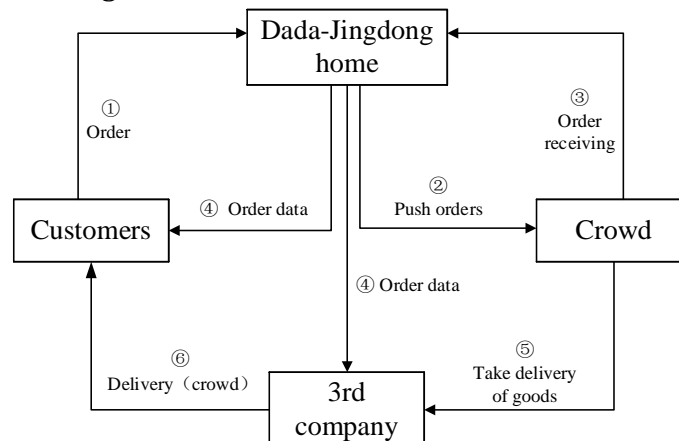


Fig. 2 Dada-Jingdong Home Delicery Flow Chart

(3) Eleme-Fengniao Delivery

"Eleme" Started with food delivery, founded in 2008. And then expanding its business to the O2O local life service scene, including the delivery of fresh fruits and vegetables, supermarket, even convenience markets. "Fengniao Delivery" was established in 2015. which includes full-time professional delivery staff and crowd. This combination effectively reduces the logistics cost while ensuring the quality of delivery services. The emergence of Fengniao Delivery provides a solution for the Eleme food delivery market to face the increasingly fierce competition delivery market, and satisfies the individual users and small-scale commercial customers' requirements for the increasingly quality of O2O local life service. See Fig.3:

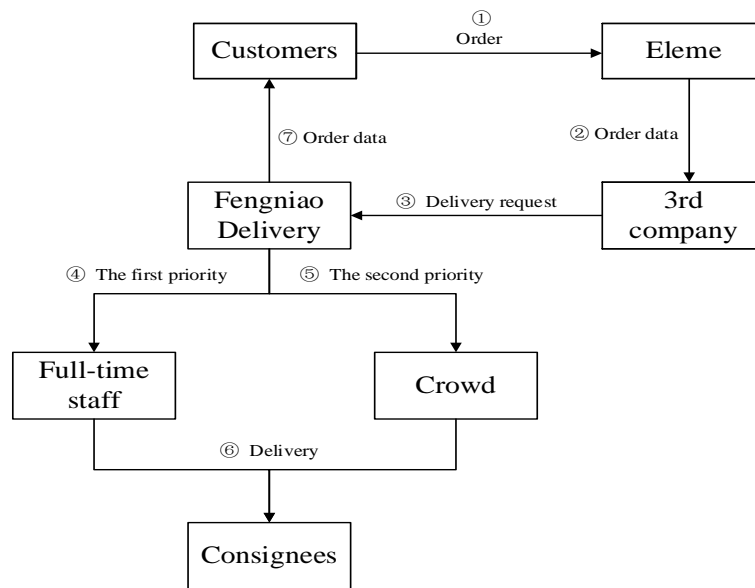


Fig. 3 Dada-Jingdong Home Delicery Flow Chart

4.2. Comparative Analysis between Crowd Logistics Companies

Crowd logistics has always been a very important part in the development of Renren Delivery, and its business slogan is "instant delivery platform in the same city"; Dada-Jingdong Home obtains crowd logistics resources through mergers and acquisitions; Eleme, In the early development, its delivery activities did not involve crowd logistics resources. The emergence of Fengniao Delivery improve service efficiency while reducing platform delivery costs. Unlike the other two companies, the Fengniao Delivery has both full-time professional staff and crowd, which are general public.

In this chapter,we will compare the three companies in the form of a table based on the business model canvas. As shown in table1:

4.3. Crowd Logistics Versus Traditional Last-mile Logistics

Through the analysis of the business models of the three crowd logistics companies, we find that crowd logistics is currently mainly used to perform last-mile delivery activities in urban logistics. Compared with traditional logistics, due to the participation of the crowd and the extensive application of information and communication technology, crowd logistics has changed its operation mode in many aspects. As shown in table 2:

Table 1.Comparative analysis between crowd logistics companies

Element	Similarity	Renren	Dissimilarity Dada-Jingdong	Eleme
Customer segement	<ul style="list-style-type: none"> • Individuals • 3d company • crowd 	Crowd	Jd e-commerce platform	Catering takeout
Value proposition	Crowd:income 3d Co.:crowd	No products Just service	Products from cooperative partners	Foods for customers
Channel	<ul style="list-style-type: none"> • Web/APP • Soical media 	<ul style="list-style-type: none"> • Alipay • Cainiaoguoguo • API 	<ul style="list-style-type: none"> • Web/APP • API 	<ul style="list-style-type: none"> • Alipay • Tmall • Freshhema
Key activities	<ul style="list-style-type: none"> • Attract users • Delivery acitivities • Provide protection and safety 	Delivery activities between individuals	Customers order in Dada-JD; Crowd delivery products to customers;	Customers order foods in Eleme Crowd delivery foods to customers
Key resource	<ul style="list-style-type: none"> • Network externality • Key partners • ICT tech. 	<ul style="list-style-type: none"> • Few users • Small network effect 	Large number of users and service service	<ul style="list-style-type: none"> • Food delivery • Maximum number of users • LBS(Location Based Service) • Regular courier and crowd
Key partners	<ul style="list-style-type: none"> • users • 3d Co. • crowd 	<ul style="list-style-type: none"> • Alipay • cainiaoguoguo • Franchisor 	JD e-commerce	<ul style="list-style-type: none"> • Alibaba • Tmall • Freshhema • Regular courier and crowd
Cost	<ul style="list-style-type: none"> • ICT constraction and maintenance • Market development • User acquisition • Legislation,taxes Others 	The part of market development account for most	The part of user acquisition account for little	The cost of regular couriers
Revenue	<ul style="list-style-type: none"> • Service charge • Digital • Advertising • Sale of equipments • Big data Investment 	<ul style="list-style-type: none"> • No equipment for sale • No digital AD revenue 	Revenue channels from JD	Food delivery activities

Customer relationship	<ul style="list-style-type: none"> • Appropriate value proposition • More user-friendly experience • ensure users' information and fund security • Good corporate image 	more diverse value proposition for users	Optimizing business	<ul style="list-style-type: none"> • Provide targeted services for Regular couriers and crowd • Optimizing business
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Table 2. Crowd Logistics versus Traditional last-mile Logistics

	Traditional Logistics	Crowd Logistics
Role	Co.: Logistics service provider CUST: Supply chain terminal	Co.: E-commerce platform CUST: Co-creator of value
Customer	<ul style="list-style-type: none"> • Fixed groups, cooperative relations • Single customer structure • Customer plays a single role 	<ul style="list-style-type: none"> • The number of customers is not stable\ • Multi-client structure • Customer plays many roles
Value proposition	<ul style="list-style-type: none"> • Linear(provider-customer) • Single(delivery services) • Centralization 	<ul style="list-style-type: none"> • Networked • Diversification • Decentralized
LSP	<ul style="list-style-type: none"> • Stable capacity, low elasticity • Professional and security • Most of the logistics resources owned by the enterprise • High costs but standardized • Logistics service diversified 	<ul style="list-style-type: none"> • Unstable capacity, high elasticity • Amateur and have security risks • crowd + full time • Logistics resources and physical assets belong to the crowd • Low logistics cost, personalized service
Key resource	<ul style="list-style-type: none"> • customer • Traditional logistics infrastructure 	<ul style="list-style-type: none"> • Information platform • Users • Key partners • Network externality • Mass data
Revenue	<ul style="list-style-type: none"> • Single and fixed source • The service charge is fixed 	<ul style="list-style-type: none"> • Diverse but unformed source • Dynamic pricing • Variety
Information system	Enterprise internal software, Mainly used for logging work	<ul style="list-style-type: none"> • Act as an e-commerce platform • Act as an intermediary
Performance measurement	KPI	<ul style="list-style-type: none"> • Rating system • Online reviews

4.4. Managerial Implications

4.4.1. Improve Network Effect(Externality)of the Platform

For crowd logistics companies to survive, customers on both the supply and demand sides must ensure a certain scale. Considering that the resources at both sides are unstable, the shortage of crowd will cause the customer's demand to be unsatisfied. On the contrary, the lack of customer orders will also cause the delivery staff to fail to receive the order and cannot get enough revenue from the platform. In the long time, the failure to satisfy the customer's needs results in a reduction in the number of customers, which in turn leads to a reduction in the number of orders on the platform. The delivery staff cannot obtain enough orders from the platform to get more income. Such a vicious circle will eventually lead to a large loss of platform customers, business volume will decrease, and lose lots of revenue.

This dilemma is exactly the problem that many Chinese crowd logistics companies are facing, which we mentioned in 4.1. Well network externalities are of great significance to attract more customers, business expansion and market development, and help companies win the market segment competition.

4.4.2. Find out How to Get Revenue

Chinese Internet economy is developing rapidly, and crowd logistics is still in the ascendant. Many crowd logistics companies have similar business models, such as "UU Paotui" and "flash delivery" companies that have similar services to customers. The overlap of market segment leads to fierce competition. In order to acquire customers and occupy the market, companies often adopt policies such as price concessions and subsidies to attract customers and the crowd. In the end, competition between enterprises often evolves into competition between the "financial strength" of investors behind the enterprise. Which means the one who throws the most money can win this competition. In the current market environment, it is difficult for startups to make a profit in the short term, which requires managers to have a long-term plan for the company's financial budget.

Judging from the existing revenue channels of crowd logistics enterprises (4.3), the platform's service fees have not been standardized, the enterprise itself and the entire industry are in a "trial and error stage", some other revenue channels are not stable. Improving the revenue is also a problem that must be faced by crowd logistics.

4.4.3. Credit and Service Quality

The traditional logistics industry is guaranteed by corporate credit, which is guaranteed by legislations and industry regulations. In comparison, the delivery staff of crowd logistics companies are very unstable, incomplete management and lack of loyalty to the company make it's difficult to control the quality of delivery services. There are some potential defects in business security and integrity.

Considering the status quo of crowd logistics, the security and credit supervision of this industry have not yet been recognized by government agencies. Find more reasonable and effective ways to prevent risks to ensure the information security of the customers and improve service quality are necessary conditions for the sustainable development of crowd logistics. For example, use the information system to monitor and record the entire process in real time or use QR code to hide the private information.

4.4.4. Legislation and Policy

An interview with a senior executive of a Taiwan company, we learned that even it's the same company, there are some differences in different regions (Mainland China, Taiwan, Hong Kong). In case 4.1, According to the (Postal Law) of China Mainland, enterprises that carry out express business must obtain the (courier business license), and the proportion of employees holding licenses must reach more than 30%. At the same time, to engage in express,

individuals need to participate in the training organized by the postal department and obtain the "courier qualification certificate" [22]. Obviously, crowd logistics have hit the barriers of policy supervision. Renren Delivery was banned by the government when it expanded in Henan, Hubei and other cities.

Unbalanced and unsynchronized development of the new business model and traditional policies is the main reason of the contradiction. It is also a challenge faced by crowd logistics. How to find the balance between the innovation of business models and regional laws and policies to ensure the development needs to be urgently addressed by crowd logistics practitioners.

4.5. Academic Implications

Like mentioned in section 4.4.4, the development of crowd logistics is restricted by local policies and legislations. This contradiction is caused by the emerging business model not suitable for social development, or because the government fails to grasp the market development trend in time, then cannot create a suitable social legal environment for crowd logistics. In order to support government decision-making and provide a basis for the revision of legislation, the policy constraints faced during the development of crowd logistics should be studied in depth. Such as taxes, the accountability for accidents in crowd logistics activities, and the legality of the public to undertake delivery services.

The emergence and development of crowd logistics cannot be separated from the information platform, As mentioned in section 4.3, The information platform acts as the "media", and assumes the order assignment task. The users require the information platform to provide a friendly and efficient trading place, and a reasonable and fair order assignment mechanism. Future research can study how to ensure the transaction efficiency of the information platform, improve user friendliness, and optimize the order assignment process.

In addition, how crowd logistics implement dynamic pricing mechanisms(4.3), ensure supply and demand balance and maximize platform revenue. Finally, how to manage the service quality of crowd logistics and solve the problems of unmanned orders, customer privacy leaks, and damaged goods caused by the low controllability of crowd logistics (4.4.3) is not only a challenge faced by practitioners, Further academic research is needed to provide theoretical support.

5. Conclusion

This article takes three companies that use crowd logistics to carry out delivery activities as research objects, then analyze their business model through data collection and communication with the practitioners. The results show that crowd logistics have value in many aspects, such as customers networks, revenue and cost structures and operating process; based on this, three companies are compared to clearly show the similarities and differences between the development background and business model. The comparative analysis results can provide readers with comprehensive and accurate information about the development status of crowd logistics in China. Finally, this paper starts with the pain points that the crowdsourcing logistics industry needs to solve urgently, and puts forward suggestions on economic, social, and policy aspects for practical and theoretical research. In summary, this paper filled the gap of academic research about crowd logistics, especially the "Chinese phenomenon," and lay the foundation for future research. On the other hand, this paper also provides a reference for crowd logistics practitioners to avoid economic risks, adapt to the social development, establish a sustainable business model, and maximize the revenue and customer value brought by crowd logistics.

The paper also has some limitations. Firstly, the research objects are Chinese companies, which are limited by the local culture environment and legislations. It is unknown whether the results are applicable to other countries and areas. On the other hand, the methods in this paper have some subjective interference. For example, the information from company's official website and provided by employees may have subjective opinions. Although we collect data from many parties and strives to be objective and fair, there are unavoidable deviations. Future research can select crowd logistics companies around the world, makes the research results more representative, In addition, the method of Data collection can adopt more comprehensive methods, such as using expert interviews to conduct face-to-face communication, with a more comprehensive voice and a more standardized process to minimize subjective errors in the data and the final results.

References

- [1] statista. Retail e-commerce sales worldwide from 2014 to 2021 (in billion U.S. dollars). Retrieved march 2018, from <https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/>.
- [2] eMarketer. Global retail e-commerce sales are expected to reach \$3.563 trillion in 2019. Retrieved 2019, from <http://www.199it.com/archives/856125.html>.
- [3] Ho, L.-H., & Chang, P.-Y. INNOVATION CAPABILITIES, SERVICE CAPABILITIES AND CORPORATE PERFORMANCE IN LOGISTICS SERVICES [J]. *The International Journal of Organizational Innovation*, 2015, 7(3): pp. 24-33.
- [4] Roel, G., de, V. E., & Thierry, V. Characteristics of innovations in last-mile logistics-using best practices, case studies and making the link with green and sustainable logistics. *Association for European Transport and contributors*, 2009, pp. 1-21.
- [5] Buldeo, R. H., Sara, V., Jan, M., & Cathy, M. Crowd logistics: an opportunity for more sustainable urban freight transport? [J] *European Transport Research Review* 2017, 9(3).
- [6] Carbone, V., Rouquet, A., & Roussat, C. The Rise of Crowd Logistics: A New Way to Co-Create Logistics Value. [J] *Journal of business logistics*, 2017, 38(4): pp. 238-252.
- [7] FORTUNE. Amazon ponders crowdsourcing deliveries with 'On My Way' program. Retrieved 6 16, 2015, from <http://fortune.com/2015/06/16/amazon-crowd-source/>.
- [8] Howe, J. The Rise of Crowdsourcing. *WIRED*, 2006.
- [9] Mehmman, J., Frehe, V., & Teuteberg, F. Crowd Logistics – A Literature Review and Maturity Model. *Innovations and Strategies for Logistics and Supply Chains*, 2015, pp. 128-145.
- [10] Frehe, V., Mehmman, J., & Teuteberg, F. Understanding and assessing crowd logistics business models -using everyday people for last mile delivery. [J] *Journal of Business & Industrial Marketing*, 2017, 32(1): pp. 75-97.
- [11] WangYuan, ZhangDongxiang, LiuQing, ShenFumin, & LeeHayLoo. Towards enhancing the last-mile delivery: An effective crowd-tasking model with scalable solutions. [J] *Transportation Research Part E: Logistics and Transportation Review*, 2016, 93:279-293.
- [12] Devari, A., Nikolaev, A. G., & He, Q. Crowdsourcing the last mile delivery of online orders by exploiting the social networks of retail store customers. [J] *Transportation Research Part E: Logistics and Transportation Review*, 2017, 105: pp. 105-122.
- [13] Kohler, T. Crowdsourcing-Based Business Models: How to Create and Capture Value. [J] *California Management Review*, 2015, 57(4): pp. 63-84.
- [14] Mladenow, A., Bauer, C., & Strauss, C. "Crowd logistics": the contribution of social crowds in logistics activities. [J] *International Journal of Web Information Systems*, 2016, 12(3): pp. 379-396.
- [15] Yin, R. K. *Case study research and applications : design and methods* (6th ed. ed.). [M] Los Angeles, CA : Sage, 2018. - 317 p.

- [16] Lewis, M. W. Iterative triangulation: a theory development process using existing case studies. [J] *Journal of Operations Management*, 1998, 16(4):pp. 455-469.
- [17] Alexander Osterwalder, & Yves Pigneur. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. [M] John Wiley & Sons, 2010.
- [18] Zott, C., Raphael, A., & Massa, L. The Business Model: Recent Developments and Future Research. [J] *Journal of Management*, 2011, 16(4):pp. 1019-1042.
- [19] Chesbrough, H. *Business Model Innovation: Opportunities and Barriers*. Long Range Planning, 2010, pp. 354-363.
- [20] Hartmann, P. M., Zaki, M., Feldmann, N., & Neely, A. Capturing value from big data – a taxonomy of data-driven business models used by start-up firms. [J] *International Journal of Operations & Production Management*, 2016, 36(10):pp. 1382-1406.
- [21] Fu, W., Wang, Q., & Zhao, X. The influence of platform service innovation on value co-creation activities and the network effect. [J] *Journal of Service Management*, 2017, 28(2):pp. 348-388.
- [22] Duan Y L., *Crowd logistics: growing up in trial and error*, [J]. *Logistics Technology*, 2015, 34 (16):11-12.(in Chinese)