



# Competition Strategy of Crowdsourcing Logistics Service Quality Based on Big Data Technology

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**Abstract.** “Big data” has become a century-old keyword and will comprehensively involve all aspects of economic and social life. Big data is a leap in data storage and processing capabilities in the Internet era. In the era of big data, logistics companies are listed as one of China’s top ten emerging service industries. As one of the national development strategic industries supporting my country’s economic growth, the development of the crowdsourcing logistics industry is still lagging behind. Therefore, many logistics companies have encountered a series of opportunities and risks in the process of growth. This paper adopts RayData big data visual interaction system to integrate the volume of express delivery business and express complaints in China. Analyze the development status of crowdsourcing logistics through data visualization technology. From this, four major risk points are summarized: distribution risk, technology risk, service risk and trust risk. In addition, it also focuses on the analysis of the possible role of big data technology in crowdsourcing logistics, including a series of improvements in user experience, logistics cost, distribution efficiency, and human resource allocation. Finally, combined with the above analysis, a set of crowdsourcing logistics service quality competition strategies based on big data technology is proposed. This will help promote the healthy development of crowdsourcing logistics, improve the technical level of important data of logistics companies, and establish a sound regulatory and legal system.

**Keywords:** Big Data · Crowdsourcing Logistics · Logistics · RayData

## 1 Introduction

In recent years, with the steady development of China’s society and economy, in the context of the new era of “Internet +,” the concept of big data analysis has flourished, and the support methods of mobile devices have become more and more perfect, and new business models have emerged one after another, seriously impacting the daily life of human beings. Living and consumption habits, the leap-forward development of China’s express delivery industry has formed a situation that is difficult to contain. By 2015, China’s express delivery industry has achieved a total sales volume of 20.6

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billion pieces, a year-on-year increase of 48%, and the fastest daily processing volume has reached 160 million pieces; the national express business revenue has reached 270 billion, a year-on-year increase of 34%. Intra-city logistics distribution, especially in the last three kilometers of the end, is increasing in a number of business orders, and traditional distribution business is increasingly unable to solve such a vast number of business orders every day. The self-built logistics distribution system also has some high costs. Therefore, the crowdsourcing model based on credit has become the best way to solve the intra-city logistics and distribution problem. Crowdsourcing logistics has also opened the best era of “Internet + logistics” [1] This paper adopts RayData big data visual interaction system to integrate the volume of express delivery business and express complaints in China. Analyze the development status of crowdsourcing logistics through data visualization technology. Compared with traditional data analysis, it has higher collection efficiency and better comprehensibility, and thus summarizes four major risk points, and analyzes the possible role of big data technology in crowdsourcing logistics. Finally, combined with the above analysis, a set of crowdsourcing logistics service quality competition strategies based on big data technology is proposed. In order to promote the sound development of crowdsourcing logistics, improve the technical level of important data of logistics enterprises, and establish a sound regulatory and legal system.

## 2 Discussion of Related Concepts

In this chapter, concepts related to big data and crowdsourcing logistics have been discussed.

### 2.1 Big Data Technology

“Big data” is an information system with a large volume and a large type of information, and such an information system cannot use traditional database methods to capture, control and dispose of its information. “Big data” first refers to the large volume of information, especially large data sets, usually within 10TB, but in practical applications, many enterprise users put several information systems together, which already constitutes the amount of PB-level information; then It means that there are large types of information, information comes from a variety of information sources, and there are more and more types and forms of information. It has already broken through the scope of structured information defined in the past, covering semi-structured and unstructured information. Then it means that the data processing efficiency is fast, and the real-time processing of information can also be realized under the condition of extremely huge amount of data. The last feature refers to the high accuracy of information. Due to the huge demand for new data sources for social information, business information, transactions and services, the limitations of the original data sources have already been broken through, so they increasingly need more powerful data sources. The power of information ensures its authenticity and security.

## 2.2 Crowdsourcing Logistics

Due to the vigorous development of the Internet business, people can use orders on computers or smartphones to choose services, shop, or make online payments. This is also a more convenient shopping experience [2]. With the development of these industries, the crowdsourcing logistics method was born. This new type of business behavior is to create the most cost-effective transportation system within a certain time frame through the application of information technology or the use of idle manpower. In general, crowdsourcing logistics is to make the best use of LTL logistics and distribution through the network platform and rationally make use of idle and scattered logistics resources, such as express delivery companies. The crowdsourcing logistics method can stand out in the “Internet + “ period, which is due to the technical advantages they have. Under normal circumstances, the work of crowdsourcing is assigned to a certain person by the group or completed together, but when there is a special situation that requires the group to complete the work together, it can be achieved by relying entirely on the work of non-group individuals. In the form of crowdsourcing business system, the problems that can be solved by professional technology in the past can now be easily through the network without geographical restrictions, unifying the public’s ability, creativity and intelligence, so as to rationally optimize the allocation of social resources and reduce the number of enterprises. Cost of production.

## 2.3 Characteristics of Crowdsourcing Logistics

Due to the vigorous development of the Internet business, people can use orders on computers or smartphones to choose services, shop, or make online payments. This is also a more convenient shopping experience [2]. With the development of these industries, the crowdsourcing logistics method was born. This new type of business behavior is to create the most cost-effective transportation system within a certain time frame through the application of information technology or the use of idle labor force. In general, crowdsourcing logistics is to make the best use of LTL logistics and distribution through the network platform and rationally make use of idle and scattered logistics resources, such as express delivery companies. The crowdsourcing logistics method can stand out in the “Internet + “ period, which is due to the technical advantages they have. Under normal circumstances, the work of crowdsourcing is assigned to a certain person by the group or completed together, but when there is a special situation that requires the group to complete the work together, it can be achieved by relying entirely on the work of non-group individuals [2]. In the form of crowdsourcing business system, the problems that can be solved by professional technology in the past can now be easily through the network without geographical restrictions, unifying the public’s ability, creativity and intelligence, so as to rationally optimize the allocation of social resources and reduce the number of enterprises. Cost of production.

## 2.4 Flexibility

The express logistics platform can deliver goods to your door only after registration, identity verification and professional training are done in crowdsourcing [3]. Like traditional delivery methods, it is not constrained by employment, but has a lot of autonomy.

The exchange behavior subject in the activity of exchange is directly affected by personal subjective cognition and objective conditions. It will withdraw the organization of the relatively loose exchange of packages because the individual is psychologically unwilling to take the package and cannot get appropriate free time. The lines between organizations and organizations are blurred and constantly changing.

### **3 Advantages of Crowdsourcing Logistics Under Big Data Technology**

In this chapter, the total volume, year-on-year, and month-on-month growth rate of China's traditional express delivery business in 2021, as well as various data models for first-tier and new first-tier cities, are derived through the RayData big data visualization interactive system., the chain growth data were compared. It can be seen from the survey data that when large-scale shopping events such as Jingdong 618 or Taobao 1111 come, the express delivery business will face great pressure. Therefore, it can be seen that the volume of express complaints quickly peaked at this time. Compare with traditional logistics, crowdsourcing logistics under the support of big data technology will bring about a series of optimizations such as user experience improvement, enterprise cost reduction, and delivery efficiency improvement.

#### **3.1 High User Experience Effect**

The addition of crowdsourcing logistics expands the logistics distribution efforts and effectively improves the timeliness of logistics distribution services. Especially during the promotion period of e-commerce networks such as "Double 11" and "618", due to the surge in transportation volume, the logistics and distribution outlets of major express companies are seriously stagnant in goods, which is closely related to the total number of couriers and the number of orders [4]. Clearly inconsistent. With the help of the crowdsourcing network platform, "self-directed couriers" can join the courier team in fragmented spare time, divert express delivery tasks, reduce the logistics and distribution work pressure of express companies, and speed up the delivery of mail. In addition, the crowdsourcing logistics platform will provide services for nearby employees to pick up or deliver to their home according to the address and location of the "self-directed courier", which greatly reduces the cost of picking up and dispatching and improves work efficiency.

#### **3.2 Cost Saving**

Crowdsourcing logistics "employs people without raising them", which effectively saves huge operating costs. The courier company must bear labor costs such as salary and social insurance for full-time logistics employees, while "self-directed courier" refers to automatic part-time personnel, which has no employment relationship with the logistics company, and the company only needs to provide a little labor. The crowdsourcing model can enable logistics companies to exchange more logistics resources at lower costs. Characteristics of crowdsourcing logistics [3].

### **3.3 Optimizing Resource Allocation**

Crowdsourcing logistics can fully explore and utilize social resources, create job opportunities for the public, undertake logistics tasks when conditions permit, time is sufficient, and routes are feasible, and obtain certain returns. From the perspective of the overall social situation, we can maximize and optimize the use of social public resources as much as possible without expanding the number of formal social jobs [4].

### **3.4 Rich Human Resources**

Logistics crowdsourcing does not necessarily have to employ specialized logistics personnel, because many express crowdsourcing websites only require that their staff must have a smart portable device, be 18 years old, and have passed the real-name verification on the APP [1]. At the same time, after completing the work of binding a credit card, you can be a part-time employee of the crowdsourcing distribution system. After passing the training, you can start the job immediately. Therefore, the coverage of express crowdsourcing is wider, and the funds are more abundant. It is reported that the Beijing company needs one person to deliver these thousands of part-time delivery people in the background every year, and the certification service for customers and part-time delivery personnel has exceeded one million.

### **3.5 Speed Advantages**

This kind of form in which the part-time courier hands over the goods from the point to the receiver from the contracting party, a simple business method, saves the intermediate warehousing process and distribution logistics and other links, and more efficiently solves the routine Some problems of distribution in logistics and transportation, such as slow speed, easy to explode the warehouse and other problems of bulk cargo. In a supermarket, courier services can reach customers within 2 h, or even within 1 h within a range of three kilometers [4]. The fastest urban mail business that can be achieved by conventional courier companies is completed the next morning or even in the afternoon. Relatively speaking, courier crowdsourcing is more efficient than conventional methods.

## **4 Analysis of the Current Situation of Crowdsourcing Logistics Development**

In this chapter, the series of risks encountered in the process of crowdsourcing logistics have been analyzed.

### **4.1 Distribution Risks Arising from Imperfect Relevant Policies**

This involves the safety of goods, people and money. The safety of general consumer goods cannot be guaranteed at all. Even if the platform has strictly reviewed the qualifications of delivery personnel from the very beginning, it still cannot prevent the occurrence of such problems. Therefore, even if an assessment system for delivery personnel

is established, for a delivery person, once the customer's goods are particularly valuable, there is also the possibility of taking it for himself. Although Taobao introduced Alipay's guaranteed transaction method and merchant credit, which effectively alleviated the problem of integrity in commodity transactions, the online crowdsourcing logistics distribution method is different from Taobao. Because the national delivery personnel obviously lack strong capital to ensure the quality of the goods they distribute, which also restricts the promotion of online crowdsourcing distribution. In terms of personal safety, it is usually handled by insurance companies, etc., which invisibly increases the operating pressure of the company and reduces the advantages of the crowdsourcing model [5].

#### **4.2 Technical Risks Arising from Imperfect Platform Establishment**

For the crowdsourcing logistics network platform to operate smoothly based on a large number of customers, in addition to the fierce product price war, customer experience is even more critical. The process of crowdsourcing itself is very technically difficult, but in the future, to more effectively complete the dynamic pricing of merged customers, there will be higher demands on its own software and data capabilities.

#### **4.3 Service Risks Arising from Weak Distribution Professionalism**

The logistics and distribution process naturally also involves door-to-door pickup and door-to-door delivery. The public package method will also have deficiencies in the service and quality of the sender and the picker. At present, several large-scale package network platforms have basically adopted the method of certification, except that Flash Delivery has carried out systematic training for meeting couriers in the early stage [2]. This is the most criticized problem of crowdsourcing logistics today. Although all online platforms have established a set of specifications, such as the provision that logistics and distribution must be carried out within 60 min, and online and offline training has been carried out, due to the distribution personnel The quality is uneven, and it is often impossible to obtain special equipment before reaching the corresponding level. Therefore, it often occurs that the order is not given after the order is received, and the logistics quality is damaged after arrival. At the same time, due to the insufficient binding force of the network platform on the distribution personnel, there are uncertainties in the logistics distribution service and quality.

#### **4.4 The Trust Risk of Personnel Changes**

Logistics talents are easy to lack and have poor stability, while the logistics distribution industry is faced with the situation of high talent mobility due to its low professionalism and low entry threshold, and the relationship between the logistics distribution personnel of the crowdsourcing platform and the platform is not mandatory. Contractual relationship, and there is no quality assurance system, so it is difficult to establish trust in the platform. The first is the issue of platform qualifications. Although more online platforms are emerging, their qualifications and reputation have been highly favored by consumers

and most of the logistics and distribution personnel. However, the crowdsourcing logistics platform has not been able to build a long-term and effective integrity system. Users and most of the logistics and distribution personnel still have certain doubts about the credibility of the platform, and all situations can easily lead to consumer dishonesty [6]. Even loss, and the speed of news dissemination in the Internet age is also fast, and there are high requirements for the credibility of the platform, followed by the issue of the integrity of the logistics and delivery personnel. The crowdsourcing service is difficult to manage for the public logistics personnel, and the privacy of users' personal information Personal safety protection faces considerable difficulties. As far as the Didi taxi service that has been experiencing constant accidents, crowdsourcing logistics of similar nature also face similar problems. How to reduce the probability of such problems and reduce users' concerns is particularly important [1].

## **5 Competition Strategy of Crowdsourcing Logistics Service Quality Based on Big Data Technology**

This chapter starts with five theories, including monitoring the distribution process through big data, improving the access requirements for distribution personnel, establishing and improving the supervision and legal system, improving the platform's big data technology level, and establishing legitimate interest relationships with contractors. Focus on the existing FCFS (First Come First Service) and DesCloser (Destination-Closer) two package distribution algorithms. Taking LongGang District, Shenzhen as an example, the experimental data was obtained through Tencent's Raydata platform, and the experimental data was preprocessed according to the characteristics of the model. And through experiments, the performance of FCFS and DesCloser algorithms are compared from the data of the success rate of package distribution, the time-consuming of package distribution, the number of battery cars required to distribute the package, the time-consuming of the package on the way of distribution, and the time-consuming waiting for transportation in the storage place.. The advantages and disadvantages of the two algorithms in practical applications are analyzed.

### **5.1 Monitoring the Delivery Process Through Big Data**

The use of positioning technology and intelligent monitoring technology can monitor the distribution of logistics personnel in a timely manner [2]. Trigger an alarm mechanism if any incorrect situation is found, and provide timely feedback and solutions to background personnel, especially focusing on the daily accumulation of customer data to obtain more sufficient customers Information. The use of intelligent deployment technology can reasonably call data resources, in the middle and late stages of the network platform, the use of reasonable real-time scheduling algorithms can be used to integrate commodity orders, which helps the network platform to have more effective resources, picture identification, voice assistants and other technologies to improve the logistics and distribution process [1]. Through the standardized operation process, the distribution quality can be improved. The application of big data holographic image technology can help the continuous improvement of the network platform. While improving the approval

process of dispatching orders and order grabbing, the information of logistics personnel can be realized through sampling inspection and identity verification. Standardize the effective control of logistics personnel information.

## **5.2 Improve Access Requirements for Delivery Staff**

The profit model of crowdsourcing logistics is to outsource the express tasks that were performed by full-time personnel in the past to non-designated individuals in a free and voluntary manner. If the starting point of the express is the same as the sender's journey on the day, the order can be snapped up immediately, and after the express arrives at the end, you can get a return ranging from ten to forty yuan [6]. However, to quickly complete the express delivery task, crowdsourcing logistics will produce a series of loopholes when it is not strict in personnel auditing. Therefore, it is necessary to strictly review its pre-job physiological and psychological conditions, as well as its distribution capabilities and other aspects. Carry out regular training for distribution personnel and evaluate the training effect through the examination system to further improve the service awareness and service level of distribution personnel.

## **5.3 Establish a Sound Regulatory and Legal System**

In operation, how to obtain corresponding high-quality technical talents and manage these talents with appropriate methods must be considered, and it is also a key issue in judging whether an enterprise can succeed. Therefore, selection, training and related measures are very necessary. Dada crowdsourcing logistics can be considered a good example. Businesses also need to develop their own products and markets, and they need to have more work to find appropriate models and standards to reach smaller constraints [5]. The application of the crowdsourcing logistics business model also needs to consider many aspects such as urban governance, society, public transportation, financial services, and so on. The adjustment of policies and regulations can cause problems in the crowdsourcing logistics operation. Pay attention to the regulations and do an excellent job in the government's risk early warning work.

## **5.4 Improve the Big Data Technology Level of the Platform**

Regardless of whether the competing platforms improve the level of big data technology, the strategy of the service platform to improve the level of big data technology is more beneficial to its own and the contractor's profit increase [6]. The improvement of the level of big data technology will stimulate the improvement of service quality, and the cost of paying the same level of quality control will be optimized, thereby increasing the enthusiasm of the service platform for quality control efforts. For the contractor, no matter whether the platform it serves improves the level of big data technology, its quality control level does not change. Therefore, the platform should adopt the strategy of improving big data technology, by optimizing intelligent algorithms, arranging reasonable logistics distribution paths, and ensuring the timeliness and accuracy of distribution, to attract more contractors to join and meet the needs of logistics services.

### 5.5 Establish a Legitimate Interest Relationship with the Contractor

The profit of the service platform and the contractor is positively related to the price competition coefficient. When the price competition coefficient exceeds a certain value, the profit of the platform and its contractor will increase with the increase of the service price charged by the competing platform. However, the current crowdsourcing logistics industry is highly competitive, and the service prices charged by various crowdsourcing logistics platforms are not quite different [7]. Therefore, service platforms need to compete for logistics demand by improving the quality of crowdsourcing logistics services. When the initial service quality is higher than a certain value, the profits of both parties will increase with the increase of the service quality sensitivity coefficient. Therefore, the service platform can improve the service quality at the initial moment and expand the influence of service quality on its own demand market by optimizing the platform interface operation process, ensuring the security of user information, and providing diversified and personalized services [8].

## 6 Conclusion

There are still many problems to be overcome in crowdsourcing logistics, but as far as the development trend in recent years is concerned, crowdsourcing logistics is growing rapidly. In China, these crowdsourcing service models that exist today are still only prototypes, and there are still many aspects to be improved. According to China's current national conditions, there are still some difficulties in the full implementation of crowdsourcing logistics. How to deal with the security, laws and regulations and operation problems in this model is the direction that major platforms need to work hard. But it is undeniable that the concept of crowdsourcing logistics conforms to the general development trend of today's Internet industry. By analyzing the current risks of big data technology and crowdsourcing logistics, this paper proposes a series of crowdsourcing logistics service quality competition strategies based on big data technology. It has played a role in promoting the development of crowdsourcing logistics in the Internet era [9, 10].

## References

1. Feng Rui. A new breakthrough in the development mode of intra-city distribution under the O2O environment - an analysis of the development of the crowdsourcing logistics industry in my country at the current stage [J]. *Jiangsu Business Review*, 2016, (11).
2. Li Xiangdong. Crowdsourcing logistics model "full of uncertainty" [J]. *China Business News*, 2015-06-27.
3. Zhu Yunhua, Luan Yingxia, Sun Xiaojun. Feasibility study on the development of urban distribution blue ocean by crowdsourcing logistics [J]. *China Market*, 2016, (6): 23-24.
4. Haichuan. Crowdsourcing logistics: the city is full of couriers [J]. *New Economy Guide*, 2016, (5): 18.
5. Yang Xuanran. Crowdsourcing logistics: turning everyone into a courier, the true trend is still blind YY [J]. *Entrepreneurship*, 2015, (12): 17-19.

6. Chen Junjie. Crowdsourcing logistics, playing the “lazy economy” [N]. China Water Transport News, 2015–07–22 (7).
7. Andelmin J, Bartolini E. A multi-start local search heuristic for the green vehicle routing problem based on a multigraph reformulation[J]. Computers & Operations Research, 2019, 109: 43-63.
8. Chen Ping, Li Hang. Optimization of O2O takeaway delivery route based on time satisfaction Problem research[J]. Chinese Management Science, 2016, 24(S1): 170-176.
9. Wang Xiaodi, Liu Junyong, Liu Youbo, etc. Approximated with Adaptive Segmented Aggregation Typical load curve shape clustering algorithm [J] Power System Automation, 2019, 43(1): 110–118.
10. Archetti C, Savelsbergh M, Speranza M. The vehicle routing problem with occasional drivers [J]. European Journal of Operational Research, 2016, 254(2): 472-480.

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