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Analysis of Crowdsourcing Logistics Pricing Status under O2O Model

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Abstract

This article focuses on the background of crowdsourced logistics development under the O2O model and the status of logistics pricing under this model. Firstly, the reasons for the rise of crowdsourced logistics and the problems encountered by existing crowdsourced logistics companies in their actual operation are highlighted through realistic scenarios, highlighting the importance of crowdsourced logistics pricing to the development of the enterprise itself. Then comb through the relevant literature to study the current research status of logistics in the O2O mode; secondly, use the same method from the consistency of O2O distribution and crowdsourcing logistics characteristics and the inherent characteristics of crowdsourcing logistics and its applicability to O2O distribution This article studies the distribution under the O2O model: crowdsourcing logistics; and then studies the characteristics of logistics pricing under the O2O model through the two aspects of basic pricing model and information symmetry and pricing. Finally, by combing the real problems and the literature, it is concluded that the crowdsourcing logistics pricing under the O2O model has great research value both in reality and in theory.

Keywords

O2O mode; Crowdsourcing logistics; Pricing.

1. Introduction

In recent years, the rapid development of the Internet, the popularization of smartphones, the rapid development of mobile e-commerce models, the explosion of personalized demand for consumers, and the growing maturity of O2O (online to offline) models have made consumers The sense of experience has been greatly satisfied, and with it the rapid growth in demand for logistics and distribution services. The recent development of O2O is mainly in the catering, fresh produce, and retail industries, and the characteristics of orders are mainly based on regional dispersion, high frequency, multiple varieties, small batches, and strong timeliness. This makes the cost of logistics greatly increase, and the traditional logistics distribution strategy of backlogging the goods to a certain amount is obviously no longer suitable for today's logistics needs. These are the urgent problems facing O2O logistics today.

O2O is mainly divided into O2O and O2O. The core of arrival is payment. At present, it is the world of mobile payment. The core of arrival is logistics. No matter what, logistics and distribution are required. Therefore, whether the logistics of O2O home is sufficiently competitive and low-cost directly determines the competitiveness and cost of O2O home services. Under the prevailing situation of the lazy economy, O2O home services are developing hotly, and logistics orders are showing geometric growth. On the one hand, third-party logistics has faced explosive demand for orders, and the cost of logistics distribution has greatly increased. Reduce and affect secondary sales services. It can be seen that solving the logistics

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distribution problem is the key to O2O development. The development of the sharing economy and crowdsourcing model makes crowdsourcing logistics emerge as the times require, and it becomes the best solution to the logistics and distribution problems in the O2O business model. In April 2016, JD.com acquired Dada for up to 1.6 billion yuan, becoming Dada's largest shareholder. The merger of "Jingdong Daojia" and Dada has integrated the corresponding resources, providing conditions for the in-depth operation of its O2O segment and laying a solid foundation for building a crowdsourcing logistics platform. And from the perspective of Dada, which is mainly crowdsourcing, the business scope has been achieved in 37 cities within two years, which shows that the development potential of crowdsourcing logistics is huge. With the explosive development of the O2O model, many businesses and enterprises have rushed to scoop up a gold in this field. Under the "burning money" model of O2O, many businesses have begun a "subsidy war" and low-price sales in the fierce market competition. It is expected that these measures will attract more consumers. "Subsidies" and "burning money" have been the most popular topics for Internet companies in the past few years. A takeaway of 20 yuan at the market price and a subsidy of 10 yuan are common. Consumers can go to the cinema to enjoy it by subsidizing a few dollars. For blockbusters, in terms of travel, subsidies for drivers were about twice what consumers actually paid. With such a high subsidy “burning money” competition, the costs of enterprises have increased significantly, and the problem of financing difficulties has also increased. As a result, a number of enterprises have closed down one after another, including 51 serving the food delivery platform in 2016. It went bankrupt in the same year, and it was the rarest one to provide distribution services and personalized agency operations services to merchants to declare bankruptcy. In the context of insufficient theoretical research and practical operation experience, under the situation of asymmetric information competition among enterprises, blindly reducing prices to attract consumers, so that many business enterprises have gone bankrupt. In the case of insufficient theoretical research, a crazy "price war" will eventually only exit the market. It can be seen that the research on crowdsourced logistics under the O2O model is of great significance, especially the research on its reasonable pricing has great theoretical and practical significance.

2. Theoretical Research

2.1. Crowdsourcing Concept Introduction

The concept of crowdsourcing was first proposed by Howe (2006) [1]. He pointed out that crowdsourcing refers to a company or organization that outsources the tasks performed by employees in the past to non-specific (usually large) Public network approach. Subsequently, many scholars have given explanations about crowdsourcing. BRABHAM believes that crowdsourcing is a distributed problem-solving model for enterprises to propose solutions by idle people through online publishing tasks (2008) [2]. The concept of crowdsourcing was put forward after practice. With the concept of crowdsourcing, scholars began to explore the application of crowdsourcing in depth. In the medical field, crowdsourcing methods are used to evaluate various missed dose levels of TURN [3]. In the face of small and medium-sized enterprises that do not have sufficient resources to produce high-quality products, they explore product design quality control and assurance in a crowdsourcing-based design environment [4]. It can be seen that the wide range of crowdsourcing applications has become an effective solution at various application levels. In view of the problem of the high cost of logistics and distribution under the O2O model described above, it will be necessary to apply crowdsourcing to the logistics field to solve the distribution problem. From this, it can be seen that the related research on crowdsourced logistics is to solve the logistics cost an effective approach to the problem, so many scholars have begun to focus on related research on crowdsourcing logistics.

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2.2. Logistics in O2O Mode

The "last mile" end-of-city distribution cost of urban logistics accounts for more than 60% of the total cost of urban logistics [5]. Therefore, to optimize logistics costs, it is imperative to optimize intra-city distribution. Under the O2O mode, distribution is an important part of intra-city distribution. At present, with the explosive development of the O2O mode, the number of distribution orders is also developing geometrically. Therefore, how to reduce the distribution cost under this mode has become a concern for enterprises. Based on O2O theory and O2O model, analyze the logistics and distribution of catering companies on self-service ordering platforms. It was found that the catering company's logistics and distribution O2O model can use third-party logistics to build a new logistics model for catering companies and implement catering logistics standardization of the distribution service system to reduce Logistics cost [6]. Some scholars have optimized the distribution path based on the characteristics of distribution under the O2O mode and combined with relevant intelligent algorithms. Wu Tengyu et al. (2018) [7] proposed an online travelling salesman problem with delivery based on the timeliness of delivery of delivery platforms, providing a basis for real-time dispatch decisions of delivery vehicles in reality. Zhao Quanwu et al. (2017) [8] considered the fragmentation of online orders, urban distribution costs, inventory costs and other factors to solve the urban distribution network optimization problem faced by apparel and footwear chain enterprises in implementing O2O transformation.

Consumers are more sensitive to the waiting time of physical stores than prices [9]. It can be seen that in real life, consumers pay more attention to the efficiency of real-time logistics. Therefore, experts Scholars have also started to pay attention to the timeliness of distribution under the O2O model, trying to reduce the time cost of distribution and improve the efficiency of logistics companies. Chen Ping et al. (2016) [10] based on the traditional model of picking and delivering vehicle routing problem and applied a heuristic algorithm to solve the new model that takes into account customer time satisfaction, and provided feasible suggestions for takeaway platforms to improve delivery efficiency and customer satisfaction. Zhao Daozhi et al. (2018) [11] aimed at the decision mode selection of O2O takeaway delivery estimated delivery time, and constructed three models based on different decision subjects to compare and analyze the decision of the optimal estimated delivery time. In recent years, takeaway services have been affected by a combination of internal and external factors. In order to grasp the operation of extrapolated distribution, it is proposed that the quality of outsourced distribution systems can be measured by consumer satisfaction, and then find distribution services, customer services, information management, and Order processing infected shipment allocation in descending order [12]. In addition to the food and beverage industry, in the fresh food sector, substandard products, severe product losses, logistics defects, and unstable supply have restricted its further development [13], and balancing customer satisfaction and logistics operation costs the key to sustainable development [14]. In order to strike a balance between the development of cold chain logistics and the e-commerce of fresh goods, some scholars have proposed three types of distribution models based on different O2O leaders, and continue to improve the existing e-commerce system [15]. Another scholar has studied the consumption behavior under the O2O model, and pointed out that retailers may use products with low demand and low-price elasticity as the main promotional products to maximize their returns [16]. For the field of reverse logistics under the O2O mode, Sun H et al. (2017) [17] proposed an integer programming model, which minimizes operating costs by optimizing reverse logistics. The "last mile" end-of-city distribution cost of urban logistics accounts for more than 60% of the total cost of urban logistics [5]. Therefore, to optimize logistics costs, it is imperative to optimize intra-city distribution. Under the O2O mode, distribution is an important part of intra-city distribution. At present, with the explosive development of the O2O mode, the number of distribution orders is also developing geometrically. Therefore, how to reduce the

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2.3. Distribution under O2O Mode: Crowdsourcing Logistics

2.3.1. Consistency of O2O Distribution and Crowdsourcing Logistics Characteristics

The logistics distribution under O2O mode usually adopts crowdsourcing. The development of crowdsourced logistics also provides an opportunity for the development of logistics distribution under O2O mode. Crowdsourcing logistics refers to the outsourcing of logistics and transportation work that should be undertaken by enterprises or logistics companies to the social idle masses to participate in the completion [18-19]. Zhang Xiaorong et al. (2018) [20] pointed out that crowdsourced logistics is another major innovation attempt after the Internetization, and divided the companies involved in crowdsourced logistics into Internet

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companies, traditional logistics companies and cross-border travel giants. Liu Bochao et al. (2017) [21] proposed that crowdsourced logistics mainly adopts social distribution methods, and the best part-time delivery staff in the neighborhood grabs the order and delivers the goods to consumers. Rai HB et al. (2017) [22] defined crowdsourcing logistics as a market concept supported by information connection, matching the supply and demand of logistics services with undefined external populations who have the free capacity of time and space. Compensated accordingly.

Although the concept of crowdsourcing has been proposed for a long time, there have been previous attempts at crowdsourcing logistics, but its development is mainly concentrated in recent years, so there is no relatively complete theoretical framework for crowdsourcing logistics, and related research is only in these years Began to rise. For the study of the factors affecting crowd participation in crowdsourcing logistics, Qiu Hongquan (2018) [23] pointed out that individual perception factors and system factors have a positive impact on crowd participation logistics crowd willingness, and mass participation willingness also affects crowd participation logistics crowd behavior. Has a positive impact. Guo Jie et al. (2017) [24] analyzed the collected 296 samples and found that the most influential factors on crowd participation logistics crowd participation behavior are convenience conditions according to the total influence, and the smallest is perceived risk. Liang Xiaobei et al. (2017) [25] pointed out that participation motivation, subjective norms, and perceived behavior control have a positive effect on the willingness of the participant to participate continuously, and satisfaction plays a part of the mediating role in the impact of participation motivation on the willingness to participate continuously. The development of crowdsourcing logistics has led some scholars to focus on their risk management systems. Sun Yan et al. (2017) [26] identified the risk factors that consumers in the crowdsourcing logistics field may face through literature research and fishbone diagram analysis. Empirical analysis of factors affecting consumer satisfaction.

2.3.2. The Inherent Characteristics of Crowdsourcing Logistics and its Applicability to O2O Distribution.

With the current development of crowdsourced logistics, the theoretical research of crowdsourced logistics mainly focuses on the problems in real life, task allocation, and route optimization. As the current application of crowdsourced logistics is still in its initial development stage, various experts and scholars are actively trying to apply crowdsourced logistics at all stages of logistics to reduce logistics costs. Crowdsourcing logistics itself is to reduce the cost of logistics. Optimizing and improving it on the basis of it will be another significant reduction in logistics costs, which also makes more experts and scholars devote themselves to its research. Location-based crowdsourcing is in-depth analysis of crowdsourcing in logistics, discussing its advantages and challenges, and providing the necessary foundation for a new interdisciplinary research area [27]. In the logistics strategy, the role of crowdsourcing logistics has not been thoroughly investigated and understood. Through the use of contingency theory lenses, research is conducted by simulating the same-day delivery service from distribution centers to 1,000 customer locations in New York City under dynamic market conditions, and comparing As a result, a new understanding of the performance of crowdsourcing logistics in terms of logistics efficiency was made, and strategic significance was found for how companies use crowdsourcing logistics [28]. Based on the analysis of the current situation and existing problems of the university express delivery mode, combined with the characteristics of huge delivery volume, concentrated delivery time, point-of-flow aggregation, and light and small packages, the crowdsourcing model was introduced into the university express delivery mode. University express crowdsourcing model [29]. Based on transportation research, a combined shared turnover box with transportation packaging characteristics was designed with electronic modules to meet the needs of shared and crowdsourced transportation and applied to e-commerce logistics transportation [30]. In the

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field of fresh food logistics distribution, the advantages and risks of crowdsourcing logistics model for solving the "last mile" distribution of fresh food e-commerce were analyzed, and then feasible suggestions and countermeasures for this field were put forward [31]. Furthermore, there are survey data based on the "last mile" distribution quality, customer demand, and acceptance of the fresh produce crowdsourcing model for fresh logistics, analyze the advantages of the fresh produce crowdsourcing delivery model, and give solutions to corresponding problems [32]. LONG W et al. (2017) [33] considered customer satisfaction and cold chain allocation cost, constructed a fresh cold chain logistics model based on O2O model and crowdsourcing model, and used the optimized Dijkstra algorithm to verify its effectiveness and rationality.

With the development of crowdsourced logistics and the deepening of its research, the analysis and research of outstanding companies in the field of crowdsourced logistics will be very meaningful, and it can provide a template for the application and expansion of crowdsourced logistics in the later stage. Vecera R et al. (2017) [34] focused on several of the most successful crowdsourcing logistics companies in the field of crowdsourcing logistics, found their common key standards, provided references for new companies and provided ideas for future research. Zhou Jianfeng (2018) [35] took Amazon as a case and pointed out that the emergence of crowdsourcing logistics has provided a third solution model for the logistics problems of online development of retail companies. Miller J et al. (2017) [36] measures the potential willingness of individuals to change from pure office workers to traveller shippers by collecting data on behavioral responses, in particular quantifying the free time or willingness of potential crowdsourced shippers It provides a basis for analyzing the application and effectiveness of crowdsourcing shipping for exploring the work willingness of ordinary passengers, and helps crowdsourcing shipping companies to better find potential part-time drivers.

In addition to the related research on crowdsourcing in the above fields, the delivery of the last mile has been a major concern for experts and scholars in the logistics industry in recent years. The inconsistencies in time between consumers and delivery personnel have increased the cost and difficulty of the last mile delivery. So, try to use crowdsourcing to reduce logistics costs. Last-mile delivery is critical in today's competitive environment because it is one of the major costs in the supply chain, and most major retailers and organizations are committed to providing fast and high-quality product deliveries are analyzing lower last-mile products As an alternative to delivery costs, crowdsourcing logistics is one of the most important topics, and ongoing research is being conducted to improve delivery time and reduce costs [37]. In terms of comprehensive decision-making for on-demand package delivery services, Lee S et al. (2016) [38] based on the optimal strategy of the Markov decision process to decide on crowdsourced package delivery requests, using integrated dynamic algorithms based on continuous variable feedback control to save In the entire process of crowdsourcing delivery, fuel and emissions costs were about 2.5%. Soto Setzke D et al. (2017) [39] elaborated an algorithm that matches package senders and receivers based on shipping routes and time constraints to automate and optimize driver allocation of shipping requests. Xin Z et al. (2018) [40] researched and analyzed the construction of a rural logistics network based on crowdsourcing, and made a concrete analysis of the application of crowdsourcing in rural areas and the solution of last-mile delivery.

Crowdsourcing logistics has developed rapidly in recent years, and experts and scholars are gradually broadening their research level. In terms of crowdsourcing logistics path optimization, Mu Jing et al. (2018) [41] built a crowdsourcing logistics capacity scheduling based on instant distribution and revenue incentives with the goal of maximizing the revenue of crowdsourcing logistics distribution personnel under certain customer satisfaction. Problem model. In terms of logistics information, Tang Yan et al. (2016) [42] constructed a crowdsourcing reverse logistics enterprise competitive intelligence service system, and found that the implementation of this competitive intelligence service system can realize the

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intelligent processing of large amounts of intelligence data information of the contractor and the contractor, Renewable resource technology advancement and continuous user participation provide services for enterprises to provide efficient information services and decision support. In terms of tourism, Tu Shuli (2015) [43] analyzed and researched the tourism logistics network based on crowdsourcing, and found that the development constraints of the participants of crowdsourcing, that is, the contractor, the contractor and the intermediary party, will directly affect the crowdsourcing. Success or failure. In terms of supply chain, Li Jizi et al. (2016) [44] used a case study method to take the development trajectory of Haier and Suning as a sample to analyze the development model and development path of the company's crowdsourced supply chain, and provide a complete solution for the implementation of the crowdsourced supply chain.

2.4. Logistics Pricing under O2O Model

2.4.1. Basic Pricing Model

With the rapid development of e-commerce, the conflict brought about by the opening of electronic channels under the O2O model, how to coordinate and price the dual channel structure will become the focus of scholars' research [45]. The connotation of the O2O model, that is, the scale effect of online and offline alliances, is a key issue to achieve the scale effect, that is, the problem of online and offline pricing [46]. In foreign countries, price has become the most important factor affecting whether consumers make purchases on a certain shopping website. In China, with the transparency of online information and the emergence of price comparison websites, consumers are becoming more and more sensitive to prices [47]. The study found that only when the price of O2O channels is low and the time cost of physical channels is also low, service providers adopt a strategy of simultaneously opening both online and offline channels [48], and under the influence of reputation information, online and offline channels The price, demand and profit of offline channels will all change [49]. The pricing problem under the O2O model is an issue that needs to be urgently solved in many fields. In the field of food, food processing plants should use the Starkberg game to make pricing decisions, and food retailers make optimal pricing decisions under the Bertrand game [50]. Some scholars have optimized the optimal pricing of the two channels under the Stackelberg game by establishing demand function and profit function models for grain processors and retailers [51]. Some scholars have analyzed the driving role and marketing status of O2O model for snack food marketing for small and medium-sized snack food companies, and used 4P theory to formulate a more scientific and reasonable marketing strategy from the four aspects of product, price, channel and promotion [52]. In the fresh produce field, the sales model of fresh produce is significantly different from the traditional model and O2O. To improve the coordination of the fresh produce supply chain, strategies such as increasing the proportion of online business, reducing online sales prices, and building information sharing platforms are required [53]. In the taxi market, Wang S et al. (2017) [54] analyzed the impact of government regulation on competition in bilateral markets with network externalities in the O2O era. The O2O business model is a new business model proposed by some innovative companies between online and offline channels. The supply chain decision under the O2O business model completely changes the price competition of the traditional dual-channel supply chain. The O2O supply chain Operational strategies such as price discrimination and services have become important issues [55]. For retailers in the supply chain, the Internet provides retailers with a new way to reach consumers, but it also fundamentally changes the dynamics of competition in the retail service supply chain. The mix of offline and online channels increases competition A new dimension of this competition, a core issue of this kind of competition is the pricing strategy between the two channels [56]. Although the retailer's profit is very sensitive to the choice of promotion points, but it is very stable in order quantity. The retailer may use products with low demand and price

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elasticity as the main promotional items, and choose a reasonable promotion period to maximize its Benefits [57]. For suppliers, suppliers found that disruptions in demand and disruptions in retailers' cost of sales occurred after the production plan was developed [58]. If the demand interruption meets the given conditions, the supplier needs to adjust the retail price. If the demand interruption meets other conditions, the supplier needs to adjust the retail price and production quantity. In the decentralized decision, an improved revenue sharing contract and a new supply contract Can coordinate interrupted supply chains [59]. In the fierce market competition, especially under the "burning money" mode of low industry barriers and high competition such as O2O, the competition among enterprises is fiercer, especially in the "price war" under the O2O mode. If blindly choosing a low-price strategy, the survival of O2O storage channels will face a crisis [60]. Therefore, in such a competitive situation, how to set a reasonable price has always been a big problem for merchants under the O2O model. In the actual market competition, the information between companies is not completely public. How to make a reasonable pricing decision in this case will be a difficult problem for the company to solve. In the field of theoretical research, pricing under asymmetric information It has always been a hot topic for scholars to study, providing theoretical reference for the above situation.

2.4.2. Information Symmetry and Pricing

In the face of the current fiercely competitive market, in order to protect their own interests and core values, the information between each other will not be disclosed. Even if the two parties are in a partnership, there is a certain degree of information disclosure. Reserved. Therefore, information asymmetry exists in any field. In the import and export trade, the degree of information held by the importing and exporting countries has an important impact on the final export pricing [61]. In the field of corporate mergers, information asymmetry has an impact on both the value judgment and the value game between the principal and the merged parties [62]. In the leasing market, the probability of expansion of corporate tenants is private information, which poses a challenge for the lessor to reasonably price expansion contracts [63]. Zhou Xiongwei et al. (2016) [64] studied the problem of false information in the pricing process of differentiated products in the duopoly market under the condition of asymmetric information and reasonably avoided the problem of using false information from the perspective of contracts. In the related information field, the research behavior of the seller's organization has a greater impact on the relevance of the company's earnings value than the buyer's organization [65]. In the investment field, increasing the attention of information in the equilibrium state of market clearing can reduce the risk premium of assets [66]. Guler et al. (2018) [67] studied the problem of newsboy duopoly under asymmetric cost information, and extended the model of competitive newsboy to two companies to understand their unit costs in private. Especially from the perspective of supply chain, pricing problems caused by information asymmetry are more common. Zhao Daozhi et al. (2014) [68] studied the pricing of low-carbon product lines of enterprises when consumers' low-carbon preferences were unknown, and designed a combination pricing strategy for product emission reductions and mark-ups to maximize corporate profits. Ma, Xin et al. (2018) [69] designed a suitable procurement mechanism with asymmetric information in the supply chain, in which one manufacturer and multiple suppliers are subject to the emissions trading plan. He Yan et al. (2016) [70] solved the optimal incentive strategy under differentiated pricing and unified pricing strategy of e-retailers when they operated on their own, and analyzed the impact of revenue sharing ratio on the pricing and delivery strategy of manufacturers when the platform was opened. In the case of asymmetric information, risk sharing is not only beneficial to manufacturers, but also to retailers under certain conditions, which brings a win-win situation for retailers and manufacturers [71]. Wang Xianjia et al. (2015) [72] used the Steinberg game and Nash equilibrium to study the production and pricing decisions when the supplier's production cost information is asymmetric and symmetric, and analyze the value of supplier

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cost information sharing. Yu Lijuan et al. (2015) [73] used the stackelberg game to analyze the optimal pricing of manufacturers and retailers under asymmetric demand information when they are centralized and decentralized. Wang Daoping et al. (2016) [74] studied the pricing decision of dual-channel supply chain under the background that both manufacturers and retailers have risk aversion behavior and asymmetric production information. When two competing manufacturers share demand information for products sold through the same network platform, when the platform commission ratio is too high and the economies of scale in product production are obvious, sharing demand information may not bring more expected profits to the platform [75].

3. Summary

From the existing literature, researchers mostly research the current situation of crowdsourcing logistics and the factors that affect crowdsourcing participants. At its application level, they mainly focus on the optimization of crowdsourcing logistics paths and task allocation, and the pricing Few people have studied it. In today's increasingly competitive O2O market, competition among crowdsourced logistics service providers is severe. Consumers are not limited to the demand for logistics and distribution, they are also more concerned about distribution services. With the expansion of customer satisfaction, the cost of crowdsourcing logistics service providers that provide logistics distribution has also risen. Therefore, a reasonable pricing strategy will be necessary for crowdsourcing logistics service providers and an effective way to lower their costs.

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