Analysis of China's E-commerce Delivery Time and Forecast of Future E-commerce Industry Trends

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Abstract. The rapid development of the logistics industry promotes the growth of e-commerce. With the increasing improvement of people's living standards, the requirements for e-commerce have gradually increased. Customers are paying more and more attention to delivery time. This paper wants to analyze the main competitiveness and predict the future development of three main e-commerce enterprises in China. This paper analyzed the orders and users' data of JD within a month to figure out the reasonableness of delivery time. The regression shows that there is a moderate correlation between shipping times and the first- or third-party stores. In general, JD has the perfect distribution of warehouses around China. This paper predicts a series of future developments based on the front results. There are three main predictions, core competition, offline retail, and social e-commerce. The research provides inspiration and ideas for the future development and research of the e-commerce industry.

Keywords: Delivery time · E-commerce · Customer habits

1 Introduction

1.1 Background

Global crises such as pandemic shocks, unstable external environments, frequent natural disasters, and regulatory policy changes have made global logistics networks increasingly vulnerable, and supply chain disruptions are increasing in frequency and severity. McKinsey reported that major disruptions in manufacturing production occurred on average once every 3.7 years. Experts predict that it will not be until at least 2023 for the supply chain side to return to normal. However, consumers are increasingly demanding logistics, both speed and quality [1]. According to the data, 60% of consumers around the world expect products to be delivered same-day, next-day or two-day, while at the same time requiring low-carbon sustainability. Sellers have to reorganize the supply chain through big data, cloud services, and other technical means to optimize the complete chain from product production, and storage to transportation. The report reveals the impact of delivery time and costs on consumer purchase decisions, with 60% of customers believing that fast delivery services affect the final purchase decision, and

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27% of them believing that this factor is very important. Research data shows that for 75% of global customers, whether a brand or seller is free of shipping will play a key role in final consumption, with 58% of respondents saying they want products to be free and delivered the next day.

1.2 Related Research

Borgstrom et al. explored challenges facing the strategic development of TPLs by analyzing the relationship between the evolution of TPLs, grown digitalization, and the evolution of TPLs in several situations. The research concludes that new firms are entering a market that has higher competitiveness and the TPLs' strategic development is divided into two different ways [2]. Lemardelé et al. researched the huge potential of UAV and GADD in last-mile delivery by using continuous approximation equations and the operations costs and applying these equations to two places. The research concluded different strategies when facing the regions or environments which have different densities [3].

Guo et al. researched the inner and outer problems that Pinduoduo is facing and how to help e-commerce companies to manage their logistic costs by using the case analysis method and literature review method. The research concluded that for the inner value line, Pinduoduo needs to take JIT and ABC methods to reinforce the efficiency, to the outer value line, Pinduoduo needs to build a perfect information system [4]. Kalinichenko et al. developed an algorithm to control behaviors between OP and TO by using algebraic methods and machine learning. This research concludes that this algorithm has already passed the basic test and is prepared to learn the original data from drone operating companies [5].

Ngah et al. confirmed the factors which affect the satisfaction and willingness to reuse 3PL services by using SOR theory among online sellers in Malaysia. This research concludes that dependability and elasticity influence satisfaction in a positive way and online sellers' willingness to reuse can be affected by satisfaction effects [6]. Xing analyzed the importance of computer technology (CT) to electronic logistics (EL) and the application of CT in supply chain management (SCM). The research concluded that CT promotes the development of EL [7].

Qin et al. analyzed the economic influence of the strategy of logistic service sharing by building a service-sharing mode. The research concluded different conclusions depending on the service level and market potential [8]. Sun and Fan researched how to use big data technology to satisfy the demand by analyzing the e-commerce logistics service process and logistics management systems. The research concluded that supply chain ideas, information technologies, and two kinds of links are needed to have effective use of resources [9].

Zheng et al. analyzed the existed modes of distribution adopted by e-commerce companies in China by using JD.com as an example and adopting the Analytic Hierarchy Process (AHP) method and entropy value. This research concluded that companies need to choose the correct logistics distribution mode depending on the situation of the enterprise, the development, and other suggestions [10]. Zhao et al. analyzed the management modes and other factors to increase the efficiency and reduce the cost of logistic delivery by analyzing and researching different management processes. The research concluded

that the optimal logistics distribution and process proposed by big data can improve efficiency and reduce the [11].

1.3 Objective

Chapter 2 is to describe and analyzes the JD's user and order information. Find out if some critical factors decide the delivery time. After the relevant factors are found, chap. 3 performs a linear regression fit to test the importance of the factors. Chapter 4 analyzes the advantages and competitiveness of different e-commerce companies in China and predicts future industry trends.

2 Data

All data is provided by JD.com [12]. Each SKU (Stock Keeping Unit) can be classified as "first-party owned" (1P) or "third-party owned" (3P) in the database, depending on who owns the inventory for that SKU. JD.com is in charge of all 1P SKUs, including classifying products, replenishing inventory, making prices of products, delivering orders, and customer care after the sale. On the JD.com platform, 1P and 3P SKUs compete for sales using distinct strategies of pricing and activities of marking. In this case, type 1 means 1P, and type 2 means 3P. The promise means the promised delivery day. The original data and Table 1 show that 1P orders which have promised time occupied a huge proportion of the platform, which means customers prefer to purchase the products which can be delivered fast. Table 2 shows that regardless of promise time, the total quantity of two different types is relatively equal. This combination indicates there is a large proportion of type 2 orders cannot be offered at the promised time. Table 2 also indicates that the total price of type 1 is larger than type 2. Comparing upper phenomena, here is hypothesis 1, the promised time acts as the main factor that increases the total amount and price of orders. How to determine the promised time becomes critical (Fig. 1).

3 Regression and Results

3.1 Eliminate Irrelevant Variables

To build the regression function, the first thing is to eliminate the irrelevant variables. The potential factors can be city_level, type, distance, and plus. From Table 1, 1P orders have the highest priority. Because the delivery of 3P orders is not controlled by JD, the promised time cannot be determined. The assumption is that there are less suitable warehouses in a smaller city or the city_level which has a larger value. After analyzing, plus and city_level didn't have a strong relationship with promise time (Fig. 2).

Plus is more focused on the discount instead of promising time (Fig. 3).

Above all, type and distance could be the factors that can influence the promised time. The distance is determined by the nearest warehouse and Table 3 already indicates that no strong relationship exists between the promised time and city_level, which means the location of warehouses is suitable all over China. Table 3 indicates that there is no obvious connection between the city_level and promise time.

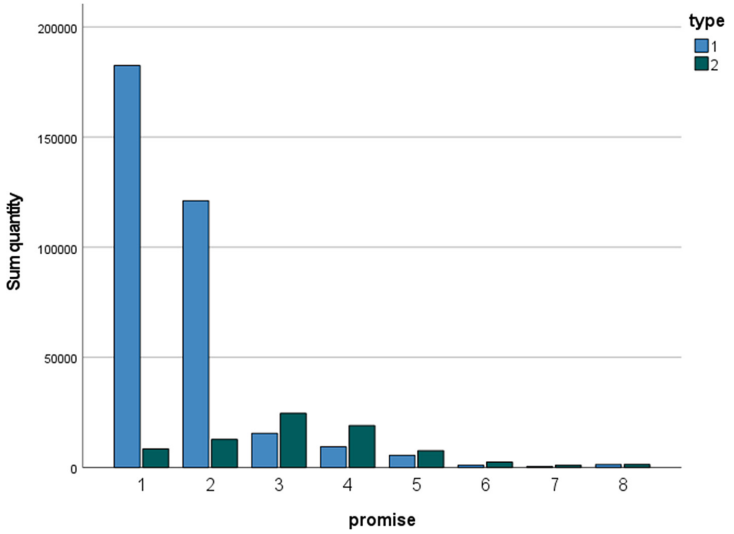

Fig. 1. Quantity of different types which have promised time

Table 1. Quantity and the total value of different kinds of order

	Type 1	Type 2
Quantity	338958	330197
Total value (yuan)	27459395.79	18079135.00

Table 2. Fields Detailed Description

Field	Description
promise	Expected delivery time (in days).
type	1P or 3P orders.
city_level	The value is arranged from 1 to 5. Level 1 relates to highly industrialized cities like Beijing; level 2 corresponds to provincial capitals like Chengdu in Sichuan; levels 3–5 are equivalent to smaller cities; and if no data is available, the value will be -1.
plus	When the relevant user is a PLUS membership on February 28, 2018, this number will equal 1.

3.2 Regression Results

$$PromiseTime = \alpha + \beta type + \varepsilon \tag{1}$$

The result shows that type has some correlation with the promised time. In real life, the most important factor is distance, but the promised time is already assumed that the

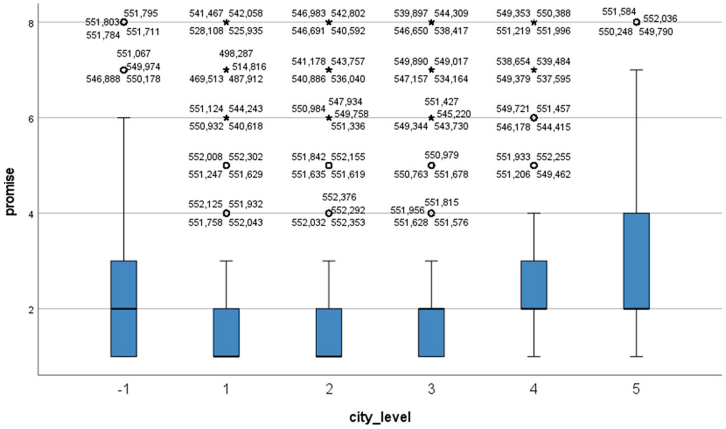

Fig. 2. Box Diagram of City_level and Promise

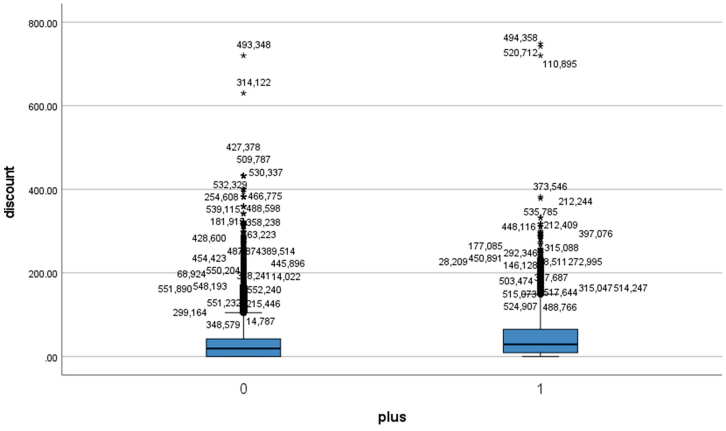

Fig. 3. Box Diagram of Plus and Discount

Table 3. Regression Results-Model Summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate	R Square Change	F Change	Df1	Df2	Sig. F Change
1	.531a	.282	.282	1.071	.282	133785.155	1	341404	.000

goods will deliver to the warehouse which has the shortest distance between it and the users' address.

Table 4. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	Statistics VIF
1	(Constant)	−.056	.006		−9.583	< .001	−.067	−.044					
	Type	1.685	.005	.531	365.767	.000	1.676	1.694	.531	.531	.531	1.000	1.000

4 Discussion

4.1 Basic Description

4.1.1 JD-Self-operated E-commerce Enterprise

Table 4 already indicates that the average promise time didn't have a huge gap among different cities. More accurately, the value of average promise time is nearly the same no matter which cities the orders go to. This result indicates the distribution of warehouses and logistics in JD is excellent. All cities have their logistic network and can prove a relatively short promise time. Speed becomes JD's core competence. There isn't t an obvious difference between the amount of 1P and 3P orders. The total value of 1P orders is higher than the total value of 3P orders about 9.38 million yuan. This indicates that the JD is focused on town products, which welfare-operated means. Because 3P orders are out of JD logistic system, 3P orders cannot acquire the speed as fast as 1P orders are. This caused 1P orders to have higher total value because a good and fast service experience makes customers willing to pay more money for the products.

4.1.2 Alibaba Group-Data-Driven

Unlike JD, the e-commerce of Alibaba is more like a platform to gather information. The main core business is Chinese retail for Alibaba, the C2C model (Taobao), and the B2C model (Tmall). Compare with JD's self-operation, Taobao and Tmall both operate on the basis of a platform model. Collecting customers and goods which come from third-party sellers, Taobao is individual sellers and Tmall is merchant sellers. The platform income is mainly from customer management, commission, and so on. The proportion of customer management revenue is about 50% to 60%, and the income of commission is approximately 20%. Less cost of operating, no demand for inventories, and a variety of goods are the three main merits of this model. The self-operated model earned customers money, but the platform model earned businesses money.

4.1.3 Pinduoduo-Low Price

The main business of Pinduoduo is platform-based e-commerce. Pinduoduo focuses on low price products and makes deals by spelling form. Part of the deals use C2M methods to directly empower factory manufacturers, reduce intermediate links such as dealers, improve factory efficiency, and thus reduce terminal price, part of it in the past two years to get tens of billions of subsidies, mainly for big-name products to subsidize, attract first-line users, while enhancing a part of the reputation. At present, the profit is mainly to charge the advertising fee of the merchant, and there is no commission, which is lower than the domestic Alibaba and JD rates. The rapid rise of Pinduoduo is based on its three designs. First is low price, the logic of Pinduoduo is products looking for customers. A huge number of small and medium-sized sellers were enticed by platform discounts and low-cost placement. The second is spelling design, this benefits from the friendships and causes rapid deflection and fission. The third is gamification design such as receiving cash, bargain take for free, and Duoduo orchards. There are lots of routines and anti-routines. These points make the customer acquisition cost much lower than other e-commerce platforms.

4.2 Difference

The main difference is self-operation or not. JD is self-operation but Taobao, Tmall, and Pinduoduo are not. This results in the different profit and operation models. Because of the feature of e-commerce, logistics becomes very important. JD builds its strong logistics network, and Alibaba builds an express delivery platform called Cainiao Station which covered SF Express, STO Express, YTO Express, ZTO Express, and so on. Pinduoduo collaborates with J&T express. Under the influence of the epidemic, placing an order at the same time on February 7, JD logistics showed that it could be delivered on February 11, Tmall Logistics showed that it could only be delivered on February 13, and Pinduoduo had to wait until February 27, more than 20 days later. Affected by factors such as the epidemic and traffic control, the delivery time of the three major e-commerce companies has been delayed to varying degrees compared with normal conditions. For example, JD in Wuhan has previously placed orders on the same day, same-day delivery, or next-day delivery, but JD still relies on a strong logistics system, twice as fast as Tmall in delivery time, and at least five times faster than Pinduoduo. In this case, JD has an absolute advantage in logistics.

4.3 Forecast

4.3.1 Core Competition

In traditional e-commerce, the total social retail sales of the e-commerce industry in 2019, Alibaba accounted for about 53%, Pinduoduo 9%, and JD 19%. The main competition is JD and Alibaba, JD benefits from self-support logistics and provides a nice delivery experience and product fame. The abundant range of brands and products that meets the needs of users is the main merit of Alibaba. Pinduoduo didn't constitute direct competition with Alibaba because of its different target customers. The main purpose of Alibaba is to prevent the location of Pinduoduo migrate up.

4.3.2 Offline Retail

According to Alibaba's financial report for the first quarter of fiscal 2019, the revenue of its new retail projects (Hema and Yintai Department Store, etc.) increased by more than 340% year-on-year. By using a powerful supply chain and logistics to reduce the price and increase the freshness.

4.3.3 Social e-commerce

The rise of Pinduoduo lies in seizing the dividends of WeChat openness. Pinduoduo opened this gate and drive other companies to try social e-commerce. JD has launched social e-commerce businesses based on the group model, such as Surprise and Fragrance. These businesses mainly benefit from the WeChat platform mini program.

5 Conclusion

This paper mainly analyzes JD's user and order data. Regression analysis was used to identify factors that were relatively relevant to delivery times. On this basis, the

characteristics of the three more mainstream e-commerce companies in China and the prospects for the future development of the e-commerce industry are compared. It was found that there was a significant gap in the guaranteed time of first-party and third-party orders in JD Logistics. JD has an absolute advantage in terms of delivery speed. Alibaba has strong cloud data technology and can integrate existing logistics companies in the market. Pinduoduo has won the low-end market through low prices. Relatively speaking, Pinduoduo has no direct competitive relationship with JD.com and Ali. Due to the growth of customer demand for logistics speed, JD.com may have greater advantages in the future. Online traffic tends to be saturated, and major e-commerce companies are gradually beginning to pay attention to offline retail, providing customers with fresh ingredients through powerful logistics technology. The rise of Pinduoduo is conducive to the demographic dividend of social software such as WeChat. In the case that quality and logistics speed cannot be guaranteed, social e-commerce has great limitations. The future of e-commerce undoubtedly needs a strong logistics network and high-quality goods to ensure customer demand for the quality of goods and delivery speed.

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