

Improving E-commerce User Satisfaction in Logistics System during the Big Data: A Case Study of JD.com

Hengyi Dong

Southwest University, Chongqing 402460, China

dhy90002@email.swu.edu.cn

Abstract. Finding the unimaginably great value beneath the surface of big data, more and more industries have considered big data as a kind of strategic resource that can bring huge benefits, including logistics industry. JD.com is taken as an example in this paper to analyze the approaches to enhance logistics and improve the satisfaction of e-commerce users in the logistics system with the power of big data technology. This essay starts with the introduction and literature review of related topics, followed by an analysis of how JD.com leverages big data to improve logistics in areas like warehousing, transportation, and information systems. Then this paper discusses how JD.com uses big data to enhance e-commerce customer satisfaction, such as improving logistics service quality and speed. Hopefully, the advanced methods that JD.com combines big data technology with logistics systems can bring some aspirations to other logistics enterprises and promote the overall development of the logistics industry.

Keywords: Big data, E-commerce, Logistics system, Customer satisfaction.

1. Introduction

Logistics is one of the critical components of e-commerce nowadays, for it plays a vital role in connecting merchants with customers, ensuring customer satisfaction, and improving efficiency while cutting costs. Big data refers to data that contains greater varieties, arriving in increasing volumes and with more generating velocity. Usually, the volume of big data is so huge that conventional data processing software cannot handle them.

Stepping into the era of information, big data has become a buzzword across various industries in recent years, and the logistics and e-commerce sectors are no exceptions. With the rapid development of e-commerce, logistics has become a crucial factor in the success of online businesses. In this context, using big data can empower logistics and provide a competitive advantage for e-commerce companies.

As one of China's top 3 e-commerce platforms, JD.com has pioneered using big data to enhance logistics operations and improve customer satisfaction. Until 2021, the inventory turnover of JDL is just one month, even when there are over 9 million SKUs to manage. What's more, customers can receive their express packages in just a few minutes after placing the orders, even during big sale periods like "11.11". This paper aims to analyze how JD.com achieves such unbelievable goals through leveraging big data technology and explore the implications that proved effective for the logistics and e-commerce industry.

This paper aims to reveal approaches to empower logistics systems and improve customer satisfaction with JD.com's real cases that apply big data technology to all aspects of the logistics system. The first two sections will introduce and review literature about JD.com, e-commerce logistics, customer satisfaction, and big data. Next, this article analyzes how JD.com uses big data to improve its logistics operations' efficiency in warehousing, transportation, and information systems. Section 4 discusses how JD.com leverages big data to enhance its customer satisfaction in aspects such as improving the quality and speed of its logistics services, increasing the transparency of its logistics processes, and providing high-quality value-added and fourth-party logistics services.

Through the specific example of JD.com's application of big data, this paper hopes to bring a useful reference for other logistics enterprises and industries to develop with the help of emerging technologies like big data.

2. Literature Review

2.1 Overview of JD Platform and JD Logistics

JD.com Mall has developed rapidly since it entered the field of e-commerce in 2004 and has become one of the most influential e-commerce platforms. JD.com, which accounted for about 20% of China's retail e-commerce market share in 2021, is China's second-largest e-commerce platform. Among the three major e-commerce platforms in China, only JD.com has established an independent logistics system of its own, which greatly ensures the consuming experience of customers. It has become one of JD.com's core competitiveness. The logistics center named "No.1 in Asia", used in 2014 by JD.com, has achieved more than 90% automation as China's most advanced logistics center.

2.2 Overview of the research on E-commerce Logistics

Logistics service has always been an important research topic because logistics distribution affects the inventory and turnover of e-commerce sellers to a great extent. The research on logistics service has begun as early as the 1960s, and the most representative theory is the 7RS theory put forward by Russ and Perreault [1]. The 7RS theory established an index system to evaluate logistics service, which include time, place, price, and other factors. Zinszer et al. emphasized ensuring customer satisfaction in logistics services [2]. Mentzer et al. proposed a new logistics service evaluation model including nine dimensions such as information quality [3]. There is also much research on logistics services in the context of e-commerce in China. He and Tian proposed new indicators to measure logistics services, which are based on the dimensions of internal and external consumers [4]. Li constructed an adaptive logistics network model to grasp the changes in external demand and respond promptly [5].

2.3 Overview of the Research on e-commerce Customer Satisfaction

With the competition between e-commerce platforms getting increasingly fierce, more and more attention has been paid to users' experience and customer satisfaction. Research on customer satisfaction has been started since the 1950s. Cardozo put forward the concept of customer satisfaction [6]. Kotler believed that customer satisfaction is a state of feeling [7]. Oliver defined customer satisfaction as a psychological and emotional response in 1981 and 1991 respectively [8,9]. Zhu proposed six factors affecting customer satisfaction in the C2C e-commerce environment [10]. Zhang perfected the evaluation system of customer satisfaction in B2C environment and added customer care factors into the system [11]. Wang et al. proposed five factors that affect customer satisfaction in the O2O environment [12].

2.4 Overview of the Research on Big Data

McAfee et al. emphasized that the characteristics of big data come from the differences in the amount of data, the speed of generation, and the types of data [13]. Sagioglu et al. revealed the importance and characteristics of big data [14]. Davis et al. summarized the definition of big data in different studies and found the rules [15]. Vassakis et al. pointed out the main difficulties in collecting and analyzing big data [16].

In summary, up to now, the research on e-commerce logistics has been relatively mature. However, there are still some problems in the research on users' satisfaction in the environment of e-commerce. Many researches are not specific enough, and market segmentation is not obvious. In addition, the research on customer satisfaction with e-commerce logistics under the background of big data is relatively few, and there are still a lot of blanks.

2.5 Data Source

All the data cited in this paper is searched from existing papers and research. Website news blogs, and related reports are important data sources for relatively fresh information.

3. The Approaches to Enhancing Logistics With the Support of Big Data

With the development of society and the advance of technology, many great technologies that are newly born, represented by big data, are bringing tremendous change to many sectors including the logistics sector. More and more people have noticed that there is potential for big data technology to be one of the most important driving forces in the logistics industry due to its data-intensive characteristics.

And the results show that being the pioneers, some logistics companies like Jingdong Logistics have successfully applied big data during their service. With the help of big data, many benefits could be brought to the logistics industry. Therefore, this essay will try to reveal the secret of JDL's success in prompting logistics with the support of big data from different dimensions such as warehousing, transportation, logistics system, and value-added service.

3.1 Warehousing

Playing an important role in the whole logistics process, a well-designed warehousing system can improve logistics efficiency while saving operating costs. Generally, the system could be divided into warehousing and sorting.

Intelligent Warehousing. Just in 2021, JDL had created a new record of inventory turnover in as few as 31 days. This figure means that it merely takes JDL 31 days to clear all the inventory, which is over 9 million SKUs, from entering the warehouse. By contrast, as a global retail giant known for high operational efficiency, Costco also need around 30 days to realize the same thing. However, it manages only a few thousand SKUs. JDL also had already accomplished its goal of finishing deliveries within 24 hours in 92% of the districts and 83% of the villages in China. All these incredible achievements are possible with the support of Intelligent warehousing constructed on the base of big data.

JD.com is gradually promoting the realization of intelligent and lean logistics strategies by applying big data technology to each aspect of warehousing operations [17]. With the strength of big data, functions like improving efficiency and cutting costs are available in the Intelligent warehousing system.

JDL can schedule, replenish, clear stuck inventory, and allocate manpower ahead of time in the face of big sales like "11.11" and "6.18" through predictive analysis based on big data. In 2017, the cumulative number of orders issued by JD.com during the "11.11" big sale exceeded 127.1 billion yuan. Despite such a huge trading volume, JD.com made 85% of all the orders produced and shipped out on the same day the charges were made. Although the volume of warehouse shipments increased by 134% compared to 2016, the fastest delivered order of JDL took just 7 minutes from order placement to receipt. JDL can achieve such high efficiency, all thanks to its warehousing system and the supporting big data algorithm. From when customers place an order to when the ones sign for receipt, the warehousing system owned by JDL always has a set of strict procedures to monitor and handle each stage. The concrete procedures are shown in the flow chart in Fig. 1. Big data algorithm is involved in almost every stage.

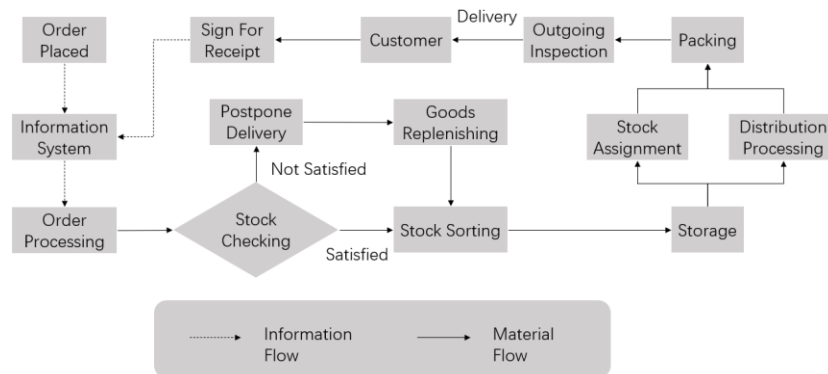


Fig. 1. Warehousing Flow Chart

JDL has been applying a delivery mode called “send before selling” to improve the efficiency of logistics during every big sale like “11.11” and “6.18”. That is to say, JD.com will always try to predict the most welcomed products according to the massive historical sales data of goods while considering other potential influencing factors like climate at the same time. After that, the sales amount of these goods in different cities will be predicted before transporting the goods to the nearest front warehouse to consumers ahead of time. To sum up, JD.com could put some goods into the mobile warehouse after predicting the demand degree of these goods in advance through the big data algorithm so that it’s possible for customers to get their packages delivered from the nearest JDL warehouse or vehicles as soon as possible or even in just several minutes after placing orders.

The application of big data algorithms could also be seen in JD Worldwide, a global service product belonging to JD.com. JD Worldwide uses big data technology to track and record delivery and outgoing conditions of goods in various regions and automatically replenish the logistics centers in advance through forecasting. JD Worldwide also arranges warehouse spaces reasonably and improves the efficiency of loading, unloading, and outgoing for goods based on the radiation identification function, which is developed from big data technology and used for identifying best-selling products [18]. Besides the benefits mentioned above, JD.com succeeds in ensuring the quality of service provided for customers even during peak hours. The key is to identify and allocate sufficient resources in advance to support the entire supply chain during the promotion. With the support of big data, JD.com has cut down the costs of logistics to 8% of total costs, and it’s aiming to lower the proportion of social logistics costs to no more than 10% from 14.7% in the following decades.

Intelligent Sorting. The first intelligent sorting center of JD.com is in Gu’an. A well-developed remote real-time monitoring system was created after introducing big data technology to solve problems caused by human work, such as long time consumption and high sorting error rate. This intelligent sorting system saves costs to a large extent while raising efficiency. According to the management of JD.com, the daily order sorting capacity of Gu’an intelligent sorting center has reached over 300000, and the correct rate of parcel sorting is 99%. Compared with the traditional matrix sorting method, the proportion of personnel input has been reduced by nearly 70%, and the efficiency has been increased by 5 times. For JD Worldwide, the intelligent sorting system could pinpoint the corresponding goods in the nearest warehousing operation center through a bar code after the consumers place the orders. Meanwhile, feedback would be sent to the platform, and suggestions would be received through big data [18]. JDL’s intelligent systems inside warehouses can geographically classify orders with similar attributes and group them, owing to the self-learning ability they gained after combining big data and machine learning [17]. All these efforts could save human resources and lessen unnecessary waste during the operation. Intelligent sorting machines, automatic weighing equipment, visual scanner, AGV robot, etc, are also the most common equipment that could combine with big data technology to improve the efficiency of intelligent sorting centers.

3.2 Transportation

Route optimization. Route optimization in logistics systems includes route optimization both inside and outside warehouses. JDL has already attempted to integrate big data technology into these two aspects of route optimization and proved its potential in this field.

JDL has shown its great ambition in building an intelligent transportation system. “Asia No.1”, constructed by JD.com, is the first logistics center running without human work in China. And this intelligent logistics center is known for its largest scale and the highest degree of automation in the field of B2C in Asia. It is said that the center has achieved over 90% automation, and the “brain” of this center can calculate 68 billion feasible paths for the robots inside in only 0.2 seconds and gives the best option for each robot. Thanks to big data’s support in optimizing the delivery path, the unmanned logistics center are 10 times more efficient than the traditional ones while having lower costs. Another intelligent transportation system inside warehouses is the “land wolves” system. This system consists mainly of a number of AGVs, which are designed to carry loaded shelves. The “Land wolves” transportation system has been widely applied to JD.com’s warehouses and has significantly reduced front-line workers’ labor intensity. This would not work without the involvement of big data.

Regarding route optimization outside the warehouse, it has a higher requirement because the specifics of a particular road need to be considered. Powered by big data and AI technology, all the delivery processes could be tracked, and JD.com could achieve dynamic transportation route planning. Regarding the cold chain logistics of JDL, transportation efficiency can be increased significantly through customized transportation paths, which can achieve the shortest and most optimal results. In addition, in view of the current situation of insufficient supply of cold chain infrastructure in China, the allocation of vehicles can be optimized. Effective cold chain facilities and equipment utilization can be raised with intelligent scheduling powered by big data [19]. During the period that Covid-19 break out in Wuhan, JD.com put the “digital twin model” into use for simulating and predicting the possible future condition of the avenue in and out of Wuhan. Ultimately, this measure, supported by big data successfully alleviated the pressure on the supply chain in Wuhan.

Distribution in the last mile. The last mile of the distribution process is of great importance because, during this stage, direct interaction will happen between the couriers and customers, significantly influencing the consumers’ satisfaction with the service provided by logistics company. From another perspective, logistics cost nearly 80 billion in 2016 globally, with last-mile distribution accounting for half of the total costs. However, JD.com don’t get discouraged by these problems like other corporations do with big data’s help.

Similar to the transportation and outside warehouses, the last mile of distribution assigned to couriers also needs the delivery path optimized based on big data. JD Worldwide uses big data technology to locate customers before assigning the nearest courier to send parcels according to the optimal route [18]. Another important factor to consider is the delivery frequency for each end station since orders must be achieved within 2 days. Owning big data from couriers’ existing distribution paths, JD.com uses traditional Operations Research to analyze the data sets so that the best margins for cost and efficiency can be worked out. At the same time, the speed promise guaranteed by JD.com can be met.

Not all regions take human resources as the main approach to distribute in the last mile. In many well-developed cities, JD.com cooperates with local service organizations of communities to employ self-service pick-up stations. The usage of big data is necessary to complete the selection of the stations’ location and the following management. In the areas that are not so developed like remote rural areas, the costs of the last-mile distribution are 5 times higher than the ones in cities, while the efficiency is quite low due to the low degree of information and complex terrain. To settle this dilemma, JD.com is trying to use delivery drones as an alternative. According to Liu Qiangdong, the logistics costs in rural areas will be decreased by 70% with drones’ help. Other than drones, intelligent express vehicles developed by JDL, which already have an L4 self-driving level, have been implemented in over 10 cities and universities like Tsinghua University. All these practices received fair feedback.

3.3 Logistics Information System—the Qinglong System

As is well known, this century is also called “the era of information”. The speed at which information is generated is far more rapid than the speed of a human’s capacity to process. That can’t be truer especially for a logistics company. Therefore, an information system that has the power to handle big data is very necessary. The system behind JD.com’s comprehensive business is called the Qinglong system. The Qinglong system processes information on a large scale daily; it supports fast data flow and allows data monitoring and optimization of each logistics node; it handles various types of information, and the data it processes is of great value. Based on the above points, the Qinglong system has remarkable characteristics of big data [20].

The Qinglong system is of great significance for keeping the operation of the JD.com platform and even the JD group. This special system can be compared to the skin, brain, and nerves of JD.com. The system acts like human skin because it can receive and collect all the data emerging during the whole supply chain, just like sensors. The Qinglong system is considered the brain of the whole logistics system due to its function of storing, collating, integrating, and analyzing information. Lastly, this system builds bridges to connect each part of the supply chain and send command signals to various terminals. That’s why it plays a role as nerves as well.

The Qinglong system is the system that upgrades and iterates fastest among all e-commerce systems. The first version of the Qinglong system emerged in 2012, with some core logistics functions and the ability to process various types of business. The function to manage the self-service pick-up station was added in the Qinglong system version 2.0. In this version, the system is upgraded with new technology, and every part of the supply chain is connected. From 2014 to 2016, “opening to customers and companies outside JD.com and building an industry ecosystem” was one of the most important strategies in the Qinglong version 3.0-5.0. The system version number 6.0 in 2016 is positioned as intelligent logistics. This version introduced many cutting-edge technologies, including big data and much more intelligent equipment. Throughout the entire evolution of the Qinglong system, one can reveal that to construct an intelligent logistics system, big data should be the core.

The main functions supported by the big data of the Qinglong system could be summarized as follows: visual presentation of data; timeliness assessment; predictive analysis; decision support. The Qinglong system opens and connects all parts of logistics, including production, warehousing, sorting, transportation, distribution processing, and customer terminals. Among the Qinglong system's functions, the most important ones are the pre-sorting and core subsystems. The pre-sorting system serves JD.com's self-management products and POP services. It enables orders to be sorted automatically. And core subsystems, including the terminal system, GIS system, etc, link all logistics parts together and constitute the Qinglong system. With the power of input big data, enormous benefits will be brought by the Qinglong system, such as increasing inventory turnover while decreasing costs and reasonably managing over 9 million SKUs. In addition, keeping all the O2O business, including 7FRESH and JD.com Pharmacy, under control while remaining efficient is also possible. In 2021, a lovely water bottle designed for children was successfully predicted and pushed to be among the most popular products on the JD platform owing to the Qinglong system.

4. The Approaches to Improve Customer Satisfaction With the Support of Big Data

Besides logistics, big data technology could also be applied to serve customers. Nowadays, customer satisfaction in logistics systems is seen as much more important than before. Part of the reason is that customers’ satisfaction degree in the logistics system of e-commerce directly affects their perception of the company’s brand image, which would further affect their loyalty and stickiness to the enterprise’s brand. There are several dimensions to consider improving customer satisfaction with the support of big data.

4.1 Improve the Speed and Quality of the Logistics Service

This approach is one of the most important and basic to reach the expected effect. Customers' most significant and obvious perception of e-commerce service in logistics systems may be the speed and quality of logistics.

To achieve such a goal, JD.com turned to big data and launched a new logistics service named "211 time-limited delivery" in 2010. This special delivery service could bring your express parcel to you on the same day if your order is placed before 11:00; the package will be delivered by 15:00 the next day if the order is placed before 23:00. Similar to the preparation made before great promoting, the terrific operation which is highly time-sensitive is achieved through the pre-storage and fronting commodity under the command of big data technology. Thanks to big data, around 90% of online orders can be delivered on the same day or the next day, among which three fifths are "211 time limited delivery". Such a splendid logistics performance is called "JD efficiency" by its customers. The title reflects the consumers' recognition of JDL's service.

Some products like fresh food and medicine need to be delivered through special cold chain networks, which have a high demand for transportation and time limitations. That's where big data technology could demonstrate its power. It's common sense that fresh food and medicine will spoil get expired if they are kept for too long before they are consumed. JD.com builds an intelligent temperature control platform with full visualization capabilities to prevent such adverse results. All the platforms and functions are constructed based on big data support. On the same basis, real-time online diagnosis of cold chain facilities and equipment can be guaranteed to ensure the system's stability and the integrity and quality of the products sent to customers. It's incredible that JDL's cold chain network owns the capability to control its system facilities and equipment intelligently according to the characteristics of different commodities, reducing the possible adverse impact of manual intervention. JD.com can deliver parcels within 24 hours in hundreds of cities and even within 4 hours in cities such as Beijing. Compared with 2019, JDL's cold chain business soared by 215% in 2020's "11.11" great sale. Big data is always the key to realizing the achievements in the cold chain.

4.2 Enhance Transparency in Logistics Process

It's meaningful and important to entitle customers to participate in the logistics service and be one of the supervisors. During this process, customers would get a sense of satisfaction and have a firmer belief in the quality of the services they receive, while corporations providing service could save some costs for supervision and get to know their consumers better. Being a win-win situation, it benefits both customers and companies, especially from the long term perspective.

To enhance transparency in the logistics process, customers should be able to monitor each process in the logistics service whenever they want. An intelligent platform designed to provide information for consumers is needed to reach the goal, and big data is indispensable to make it transparent and available. JD Worldwide has built a platform for customers to monitor all logistics nodes. Once accidents happen, couriers and customers can give feedback about the event to the management in time so that loss can be prevented before happening [18]. In this way, the risk is lower, and customer satisfaction is guaranteed. Combining the Internet of Things with big data analytics technology, the real-time flow paths of cargos and carriers will also be traceable [21].

Such an aim can also be achieved by establishing a mechanism for anti-counterfeiting and traceability of commodities. With the capability of big data technology, JD Worldwide succeeded in tracking and recording the origin and production information of overseas commodities. A platform equipped with a mechanism for anti-counterfeiting and tracing the origin was also constructed, with over six million people using it to make inquiries about traceability in 2019. By the end of 2019, more than 1 billion level of traceable data has been successfully recorded on the blockchain anti-counterfeiting platform [18]. All these efforts can, without doubt, increase users' trust in overseas brands.

4.3 Provide Add-value Services and Fourth-party Logistics Services of High Quality

The customers of e-commerce include not only individual consumers but also merchants. The approaches presented earlier in this research are mostly extended from the perspective of individual consumers to improve satisfaction using big data. Now the methods will be stated mainly from the merchants' point of view and be divided into 2 possible aspects as add-value services and fourth-party logistics services.

Concerning the add-value services, some kinds of services related to precision marketing are great ways to improve customer satisfaction. Precision marketing in e-commerce is realized through 3 steps: collecting and collating all necessary customer data, establishing a model of customers' behavior, and finally identifying the customers' portrait [22]. As the underlying and basic data to realize precision marketing, millions of data sets about the customers' browsing situation, transaction history, etc., are impossible to process without big data technology. To provide add-value services that can increase convenience and speed up response, four kinds of derived data, which can be as precise as a community portrait, are used to achieve accurate marketing [23].

For individual consumers, precision marketing can be applied in pushing personalized service product advertisements and ranking the search results according to consumers' interests, which is what JD.com are doing. In this way, offering consumers a customized shopping experience can increase satisfaction. For the merchants, precision marketing will be helpful for them to make more accurate production plans and regionalize their warehouse into proper areas based on their historical sales data and warehousing data. And by forecasting inventory and sales data, JD.com has helped the merchants on the JD platform to stabilize inventory turnover days at less than 40 days while reducing the out-of-stock rate, as is illustrated in Fig. 2. With the help of precision marketing based on big data, even "0 inventory" is possible to realize.

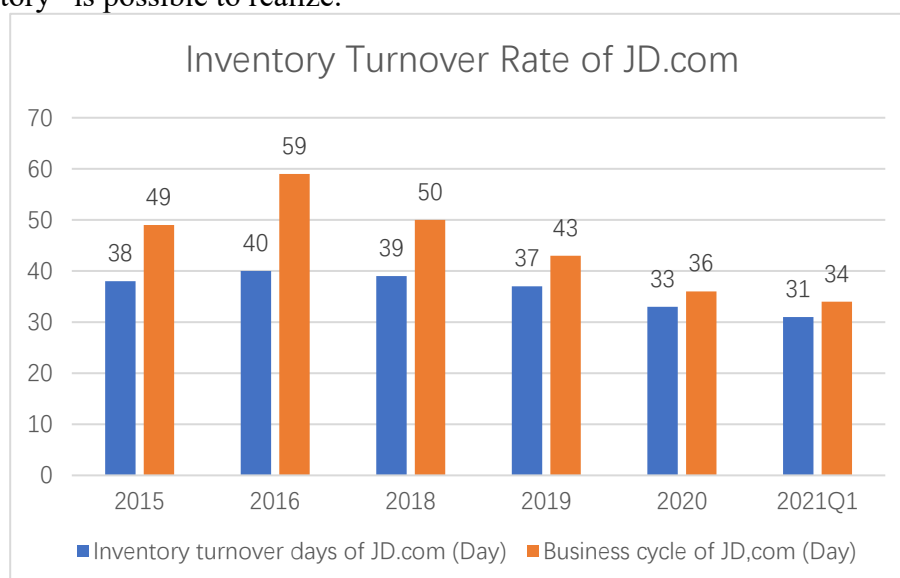


Fig. 2. Inventory Turnover of JD.com

It's wise to satisfy customers by offering them multiple services, such as sharing logistics resources and forth-party services.

JD cloud warehouse is a logistics service that integrates the third-party's warehouse resources existing in society on a platform and then shares them with partners. The intelligent management of these cloud warehouses relies on Cloud computing and big data technology. In September 2020, JD.com shared its resources with Nestle to launch a "Joint forecasting and Replenishment" project based on big data. As a result, Nestle's supply response was accelerated to a huge extent. E-commerce companies of huge scale have unparalleled advantages in data collection and analysis, which are crucial for building big data platforms, compared with small enterprises. Therefore, JD.com created a series of platforms and websites, such as JD Wanxiang, JD Cloud, and Neuhub to share data and provide various services related to big data. As for fourth-party services, JD.com opens up its

capabilities of integrating supply chains to assist companies needing to plan, design, transform, and optimize their supply chain. With big data technology, JD Worldwide designs customized schemes for merchants and helps customers to realize intelligent logistics. Owing to this, the sustainable development, and the satisfaction of those who receive JDL's service are guaranteed [18]. JD.com and Hisense established a cooperative relationship in April 2021. With JD.com's ability to integrate the supply chain, which is developed based on technologies like big data, the spot rate of Hisense increased by 4.1%, and the supply chain revenue newly brought exceeded 10 million yuan. Such win-win examples are countless. We can have a relatively intuitive understanding of customers' satisfaction with the services provided by JD.com by analyzing Fig. 3. In this figure, the popularity degree of JD.com's fourth-party and add-value services can be reflected by the growing revenue from customers both inside and outside the integrated supply chain.

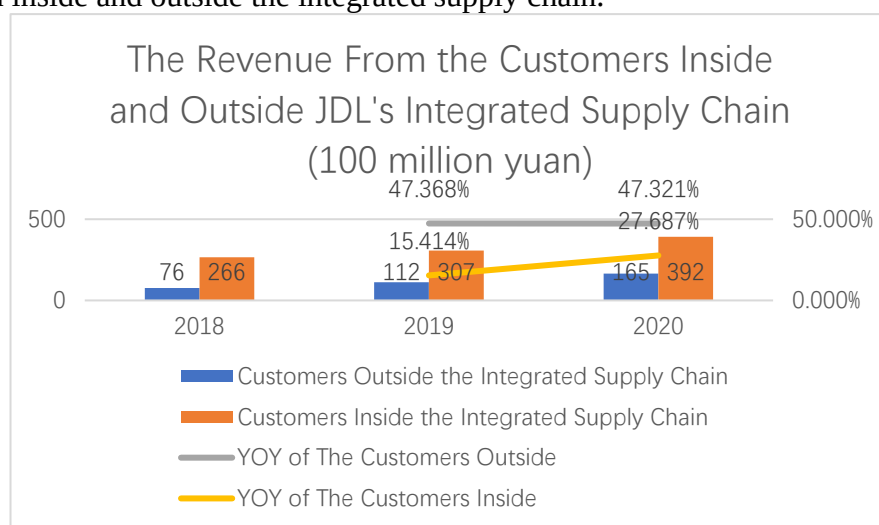


Fig. 3. The Revenue From the Customers Inside and Outside JDL's Integrated Supply Chain (100 million yuan)

5. Conclusion

Overall, this paper gives an analysis of the immense potential of big data in empowering logistics and improving e-commerce customer satisfaction, through perspectives like warehousing and approaches like enhancing transparency in logistics process.

Through the case study of JD.com, it has demonstrated the effective use of big data can empower logistics and enhance e-commerce customer satisfaction. The implement of big data technology will surely become more crucial and even be one of the core competitiveness indicators as the logistics and e-commerce industries evolved. The lessons learnt from JD.com's cases can provide valuable insights for other logistics providers and e-commerce enterprises, as well as other industries and researchers in related field.

In conclusion, combining big data technology with their business has significant implications for the logistics industry, e-commerce industry, and many other industries. The use of big data will definitely boost the efficiency and development from all aspects. This article highlights the huge potential benefits that big data may bring, and the need for further research in this field.

References

- [1] Perreault, William D., and Frederick A. Russ. (1974) "Physical Distribution Service: A Neglected Aspect of Marketing Management." MSU Business Topics (Summer):37-45
- [2] LaLonde, Bernard J. and Paul H. Zinszer.(1976), Customer Service: Meaning and Measurement, National Council of Physical Distribution Management, Chicago, IL.

- [3] Mentzer, John T. and Myers, Matthew B. and Cheung, Mee-Shew. "Global Market Segmentation for Logistics Services." *Industrial Marketing Management*, vol.33, no.1, 2004, pp.15-20
- [4] Yun, He and Yu, Tian. "Customer-oriented Logistics Service Quality Model and Application." *Logistics Technology*. 2004, No.8
- [5] Li Jiacheng, Ju Songdong & Chen Mohan. (2010). A preliminary study on the adaptive operation of logistics network oriented to user network. *Journal of Beijing Jiaotong University (Social Sciences Edition)* (04), 24-30. Doi:10.16797/j.cnki.11-5224/c.2010.04.005.
- [6] Cardozo RN. An Experimental Study of Consumer Effort, Expectation and Satisfaction [J]. *Journal of Marketing Research*, 1965, 2(8): 244-249.
- [7] Kotler P. *Marketing management: analysis, planning, implementation, and control* [M]. Prentice-Hall, 1973.
- [8] Oliver R L, Linda G. Effect of Satisfaction and its Antecedents on Consumer Preference and Intention [J]. *Advances in Consumer Research*. 1981. (8): 88~95.
- [9] Westbrook R A, Oliver R L. The Dimensionality of Consumption Emotion Patterns and Consumer Satisfaction [J]. *Journal of Consumer Research*, 1991, 18(1): 84-91.
- [10] Zhu Jing. Research on influencing factors of customer satisfaction of express service under C 2 C environment [D]. Central North University, 2014.
- [11] Zhang Jianfen. Research on the Construction and Comprehensive Evaluation of customer satisfaction Index system of B2C E-commerce [D]. Zhejiang Industrial and Commercial University, 2017.
- [12] Geng Huihui, Wang Ping. Research on the influencing factors of customer satisfaction in E-commerce [J]. *E-commerce*, 2017 (02): 44-45.
- [13] McAfee, A., Brynjolfsson, E., Davenport, T. H., Patil, D. J., & Barton, D. (2012). Big data: The management revolution. *Harvard Business Review*, 90(10), 60–68.
- [14] Sagiroglu, S., & Sinanc, D. (2013, May). Big data: A review. In *2013 International Conference on Collaboration Technologies and Systems (CTS)*. IEEE: 42–47.
- [15] Weinberg, B. D., Davis, L., & Berger, P. D. (2013). Perspectives on big data. *Journal of Marketing Analytics*, 1(4), 187–201.
- [16] Vassakis, K., Petrakis, E., & Kopanakis, I. (2018). Big data analytics: Applications, prospects and challenges. *Mobile big data* (pp. 3–20). Cham: Springer.
- [17] Liu, H., & Wang, S. (2017). The development and application of big data in warehousing logistics – "Big Data and Smart Logistics" series three. *Logistics Technology and Application* (03), 134-136.
- [18] Tang, H. (2020). Research on the application of big data technology in cross-border e-commerce development (Master's thesis, Tianjin Business University). <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD202002&filename=1020975609.nh>
- [19] Li, Y., Chen, H., & Chen, L. (2023). Application of big data in cold chain logistics field. *Smart Rail Transit* (01), 1-5.
- [20] Li, P. (2017). Overview of big data and intelligent logistics—"big data and intelligent logistics" series one. *Logistics Technology and Application* (01), 133-135.
- [21] Ayed, A. B., Halima, M. B., & Alimi, A. M. (2015, May). Big data analytics for logistics and transportation. In *2015 4th international conference on advanced logistics and transport (ICALT)* (pp. 311-316). IEEE.
- [22] Huang, Y. (2021, March). Research on e-commerce precision marketing strategy based on big data technology. In *2021 2nd International Conference on E-Commerce and Internet Technology (ECIT)* (pp. 87-90). IEEE.
- [23] Li, Y., & Cui, L. (2017). Jingdong 1-hour delivery based on accurate portrait—"big data and intelligent logistics" series four. *Logistics Technology and Application* (04), 148-150.