



Current situation Analysis and Scheme Design of JD.com Logistics

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Abstract this paper studies the current situation of JD.com logistics enterprise logistics system and the design of optimization scheme. First of all, it introduces the development of the enterprise. Furthermore, this paper briefly combs the current situation and characteristics of each link in the enterprise logistics system, analyzes the successful experience of the enterprise, and makes an in-depth analysis of the problems existing in the current operation state, and finally, in view of the current state and improvement background, briefly describes the design scheme of the whole logistics system, and makes a feasibility analysis.

Keywords JD.com logistics enterprise; logistics system; scheme design

1. Introduction

Brief introduction of JD.com logistics enterprise

JD.com Logistics, a logistics subsidiary founded by Chinese e-commerce company JD.com Group, was established on April 25, 2017. JD.com Logistics is committed to providing efficient, safe and reliable logistics services to global customers, covering warehousing, transportation, distribution, customer service and other links.

The core competitiveness of JD.com logistics lies in its strong logistics infrastructure and advanced logistics technology. JD.com Logistics has more than 1000 warehouses worldwide, with a total area of more than 20 million square meters, forming a nationwide and global logistics network. In addition, JD.com Logistics also has advanced warehousing management system, transportation management system, distribution management system and so on, which can realize the visualization and intelligent management of the whole logistics process. JD.com Logistics has a wide range of services, including e-commerce, manufacturing, retail and other industries. JD.com Logistics provides logistics services for the e-commerce platforms of JD.com Group, such as JD.com Mall and JD.com Global Shopping, as well as logistics solutions for third-party merchants and enterprises. In addition, JD.com Logistics has also launched a personal express delivery business to provide consumers with convenient delivery services. JD.com Logistics has also made remarkable achievements in logistics technology innovation. JD.com Logistics has launched intelligent devices such as drones, unmanned vehicles and unmanned warehouses, which improve the efficiency and safety of logistics operations. At the same time, JD.com Logistics is also committed to the development of green logistics, by reducing packaging waste, improving energy efficiency and other ways to reduce the impact of logistics on the environment. The development of JD.com logistics has also been widely recognized by the industry. JD.com Logistics has won many honorary titles such as "Best Logistics Enterprise" and "Best supply chain Management Enterprise", and has been selected as one of the Fortune Global 500 companies.

JD.com Logistics is a logistics enterprise with global influence. Its strong logistics infrastructure, advanced logistics technology, wide range of services and innovative logistics ideas make it highly competitive in the global logistics market.



2. The Operation Status of Jd.com Logistics System

The logistics system of JD.com Logistics Company is a highly integrated and intelligent platform, which aims to provide efficient, safe and reliable logistics services for global customers. The system covers many links such as warehousing, transportation, distribution, customer service and so on, and realizes the visualization and intelligent management of the whole logistics process.

2.1 Warehouse Management system

JD.com Logistics has a nationwide and global warehousing network, with a total area of more than 20 million square meters. The warehousing management system realizes the automatic operation of inventory management, goods in and out, inventory and other links, and improves the efficiency and accuracy of warehousing management. At the same time, JD.com Logistics also uses advanced warehousing technology, such as automatic sorting system, automatic three-dimensional warehouse and so on, which further improves the efficiency of warehousing operations.

The system includes six parts: RFID reader terminal system, vehicle terminal system, RFID middleware, Wi-Fi indoor positioning subsystem, storage material management system and server. Here is a brief introduction to these six parts.

- (1) RFID reader terminal system: responsible for identifying, reading and transmitting items through the RFID reader terminal equipment in the perception layer of the warehouse management system
- (2) vehicle terminal system: as a part of the warehouse management system, it is responsible for the positioning, scanning and information transmission of items in the warehouse.
- (3) RFID middleware: as a bridge between the perception layer and the application layer, it is responsible for processing, parsing and converting the object information collected by the RFID reader terminal system and the vehicle terminal system, so that the application layer system can read and process the information
- (4) Wi-Fi indoor positioning subsystem: responsible for realizing the indoor positioning function of people and objects in the warehouse.
- (5) warehousing material management system: as the core component of the application layer, it is responsible for realizing the functions of incoming management, outgoing management, inventory management, storage management, personnel management, system management and so on.
- (6) Server: including application server and database server, as the core processing and storage center of the whole system.

The database server is responsible for storing all the data involved in the system, including item information, storage information, personnel information, system configuration information and so on, to support the data management and query requirements of the system [1].

JD.com Logistics warehouse management system is a highly integrated and intelligent platform, which realizes the automatic operation of inventory management, goods in and out of warehouse, inventory and other links. The following are some of the main features of JD.com logistics warehousing management system:

- (1) Automation equipment. JD.com logistics warehousing management system uses advanced automation equipment, such as automatic sorting system, automatic three-dimensional warehouse, automatic handling robot and so on, which greatly improves the efficiency of warehousing operation.
- (2) Real-time inventory management. JD.com logistics warehousing management system can achieve real-time inventory monitoring and management, facilitate warehouse managers to grasp the inventory situation in time, and reasonably arrange purchase and shipping plans.
- (3) Intelligent sorting technology. JD.com logistics warehousing management system adopts intelligent sorting technology, which can automatically sort goods according to order information, which greatly improves the efficiency and accuracy of sorting.
- (4) Advanced warehousing management system. JD.com logistics warehousing management system adopts advanced warehousing management software, which can realize the whole process visualization and intelligent management of warehouse operations, and improve the efficiency and accuracy of warehousing management.



- (5) Data mining and analysis. JD.com logistics warehousing management system can deeply mine and analyze the warehousing data, provide decision support for warehouse management, and improve the science and accuracy of warehousing management
- (6) Green warehousing. JD.com logistics warehousing management system pays attention to green warehousing to reduce the impact of logistics on the environment by reducing packaging waste and improving energy efficiency

2.2. Transportation Management system

JD.com Logistics has a strong transport network, including roads, railways, aviation and other modes of transport. The transportation management system realizes the real-time tracking and management of transport vehicles and improves the efficiency and safety of transportation. At the same time, JD.com Logistics also uses advanced transportation technology, such as intelligent routing planning, real-time road condition information, etc., which further improves the efficiency of transportation operations

The following are some specific instructions of JD.com 's logistics and transportation management system:

- (1) Intelligent routing planning. JD.com logistics and transportation management system adopts intelligent route planning technology, which can automatically plan the optimal transportation route according to the information of quantity, weight and size of goods, reduce transportation cost and improve transportation efficiency.
- (2) Real-time vehicle tracking. JD.com logistics and transportation management system can realize the real-time tracking of transport vehicles through GPS and other technologies, facilitate dispatchers to grasp the location and status of vehicles at any time, and improve the accuracy and timeliness of transportation management.
- (3) Vehicle scheduling optimization. JD.com logistics and transportation management system can automatically optimize vehicle scheduling according to order information and vehicle status, improve transportation efficiency and reduce transportation cost.
- (4) Safety monitoring and management. JD.com logistics and transportation management system can real-time monitor the vehicle status and driver behavior in the transportation process to ensure the safety and compliance of the transportation process.
- (5) Transportation data analysis. JD.com logistics and transportation management system can deeply mine and analyze the transportation data, provide decision support for transportation management, and improve the science and accuracy of transportation management.
- (6) Green transportation. JD.com logistics and transportation management system pays attention to green transportation, by reducing empty driving rate, increasing loading rate and other ways to reduce the impact of logistics on the environment

2.3. Distribution Management system.

JD.com Logistics has a large distribution team, which can provide fast and accurate distribution services. The distribution management system realizes the real-time scheduling and management of dispatchers and improves the efficiency and accuracy of distribution. At the same time, JD.com Logistics also adopts advanced distribution technologies, such as intelligent distribution path planning, unmanned distribution vehicles, etc., which further improve the efficiency of distribution operations. The following are some main features of JD.com logistics distribution management system:

- (1) Intelligent scheduling. JD.com logistics distribution management system can automatically carry out distribution scheduling according to order information, dispatcher location, road conditions and other information, improve distribution efficiency and reduce distribution costs.
- (2) Distribution route optimization. JD.com logistics distribution management system can automatically plan the optimal distribution path according to the order information and road conditions, reduce the distribution cost and improve the distribution efficiency.
- (3) The management of dispatchers. JD.com logistics distribution management system can carry out real-time management of distributors, including attendance, performance assessment, etc., to improve the management level and execution of the distribution team.



- (4) Exception handling. JD.com logistics distribution management system can monitor and deal with the abnormal situation in the distribution process in real time to ensure the safety and compliance of the distribution process.
- (5) Data analysis. JD.com logistics distribution management system can deeply mine and analyze the distribution data, provide decision support for distribution management, and improve the science and accuracy of distribution management.
- (6) Green distribution. JD.com logistics distribution management system pays attention to green distribution, by reducing packaging waste, improving distribution efficiency and other ways to reduce the impact of logistics on the environment

2.4. Customer Service system

JD.com Logistics provides customers with a full range of logistics services, including order inquiry, logistics tracking, after-sales service and so on. The customer service system realizes the standardization and standardization of customer service, and improves the quality and efficiency of customer service. At the same time, JD.com Logistics also adopts advanced customer service technology, such as intelligent customer service, online customer service and so on, which further improves the efficiency of customer service. JD.com logistics customer service system is a service system that integrates a variety of functions, which aims to provide customers with efficient and convenient logistics services. From the customer's point of view, it mainly includes the following aspects:

- (1) Customer service hotline: JD.com logistics customer service telephone 24 hours a day to provide customer service. By calling the customer service number, customers can consult logistics information, complain, apply for return and exchange, and so on.
- (2) customer service e-customer service: JD.com customer service also provides electronic customer service service, customers can communicate with customer service staff through online chat or e-mail to get relevant help.
- (3) Complaints and suggestions: customers can submit complaints and suggestions through the customer service hotline or online customer service. JD.com customer service will respond and deal with the problem as soon as possible to ensure the rights and interests of customers.
- (4) After-sales service: JD.com Logistics provides return and exchange services. when customers find quality problems or dissatisfaction after purchasing goods, they can contact customer service to apply for return and exchange of goods. Customer service will assist in handling related matters according to customer needs.
- (5) logistics information inquiry: customers can query logistics information through JD.com client, official website or other channels to understand the status of orders, contact information of distributors, and so on.
- (6) door-to-door pickup: if customers need to return and exchange goods, they can call JD.com Logistics Service Hotline 950616 to make an appointment for door-to-door pickup.
- (7) Intelligent customer service: JD.com logistics customer service system also uses intelligent customer service technology to provide customers with real-time and accurate answers and help through artificial intelligence assistants

2.5. Logistics technology innovation

JD.com Logistics has made remarkable achievements in logistics technology innovation, introducing intelligent equipment such as drones, unmanned vehicles, unmanned warehouses and so on, which improves the efficiency and safety of logistics operations. Make full use of logistics resources and adopt advanced logistics technology to achieve systematic energy saving and carbon reduction in the fields of transportation, storage, loading and unloading, handling, packaging, circulation and processing, distribution and information processing [2]. reduce the impact of logistics on the environment

The logistics system of JD.com Logistics Company is a highly integrated and intelligent platform with strong logistics infrastructure, advanced logistics technology, wide range of services and innovative logistics ideas. it has a strong competitiveness in the global logistics market. The following are some of the main achievements of



JD.com Logistics in technological innovation. UAV: JD.com Logistics launched a self-developed UAV, which can achieve automatic take-off and landing, automatic cruise, automatic return and other functions, improving the efficiency of logistics and distribution in remote areas and emergencies. Self-driving car: JD.com Logistics has developed a self-driving car, which can achieve automatic navigation, automatic obstacle avoidance, automatic parking and other functions, improving the efficiency and safety of logistics distribution in urban areas. Unmanned warehouse: JD.com Logistics has established an unmanned warehouse to achieve automated storage, storage, sorting, out of storage and other links, improving the efficiency and accuracy of warehousing management. Internet of things technology: JD.com Logistics widely uses the Internet of things technology, realizes the interconnection of logistics equipment, and improves the intelligent level and collaborative efficiency of the logistics system. Big data and artificial Intelligence: JD.com Logistics uses big data and artificial intelligence technology to deeply mine and analyze logistics data to provide decision support for logistics management and improve the science and accuracy of logistics management. Green logistics technology: JD.com Logistics pays attention to the research and development and application of green logistics technology, reducing the impact of logistics on the environment by reducing packaging waste and improving energy efficiency

JD.com Logistics has strong logistics infrastructure, advanced logistics technology, a wide range of services and innovative logistics concepts, which make it highly competitive in the global logistics market.

3. The successful experience and practice of JD.com logistics.

In a short period of more than ten years, JD.com Logistics has grown into the second largest logistics company in the country, not only relying on the dividends brought by JD.com platform consumption, but also has its own secret books. JD.com logistics positioning technology-driven supply chain solutions and logistics service providers, warehousing and technology are two major weapons.

JD.com in the prospectus has always emphasized the integrated supply chain, integrated supply chain refers to: to provide customers with end-to-end, package of services integrated logistics solution. Throughout the enterprise's manufacturing, sales, after-sales and other links, including not only the basic transport, warehousing, sorting, distribution and other logistics services, but also including sales forecasting, production planning, inventory management and end-customer order management and other value-added services. In other words, ordinary express companies are only responsible for the final delivery link, while JD.com Logistics can provide one-stop services. from the sales link, JD.com Logistics began to intervene and provide sales forecasts according to its own data. the links include order management, warehousing services and the final distribution link, JD.com Logistics is all covered.

For manufacturers, this is not only convenient but also efficient. After making use of the integrated supply chain service of JD.com Logistics, the average performance cost has been reduced by 11%. The average delivery time was reduced by about 5 hours during the cooperation with JD.com Logistics

JD.com Logistics has a large number of offline outlets and self-owned warehouse investment in the early stage of JD.com Logistics. JD.com Logistics has more than 800 self-owned warehouses in the country, as well as 1400 third-party warehouses, and the storage network covers almost all districts and counties in the country. the total storage area is about 20 million square meters. That Shunfeng has only 194 warehouses of different types, covering an area of about 2.34 million square meters, which is only about 1/10 of that of JD.com Logistics. As soon as the user places an order, the goods are sent directly to the corresponding distribution station from the nearest warehouse to the user. compared with other logistics companies, JD.com greatly reduces the links of picking up and transshipment. At the beginning of its establishment, JD.com has already positioned this model, and it is this advantage that makes JD.com occupy his own place in the near-monopoly market of Taobao

Huge R & D investment has always maintained the technological leadership of the industry. JD.com Logistics has accumulated technology investment of 4.6 billion in the past three years, accounting for 3.4% of operating income, which is even higher than the cumulative investment of 3.523 billion in Shunfeng in the past three years. With the continuous investment of new technology, JD.com 's inventory turnover days has dropped to 34 days. By contrast, this index of Wal-Mart and Amazon is more than 40 days, and other domestic industries are even as high as 60 days. With the improvement of efficiency, the rate of operating expenses is also declining,



which is 10.2% in 2018, 9% in 2019 and 8% in 2020, showing a continuous downward trend, which is lower than that of SF, indicating that JD.com 's cost control ability is better than SF.



Figure 1: Total volume and growth rate of logistics from 2011 to 2020

Orange represents the total amount of social logistics, while yellow indicates the year-on-year growth rate.

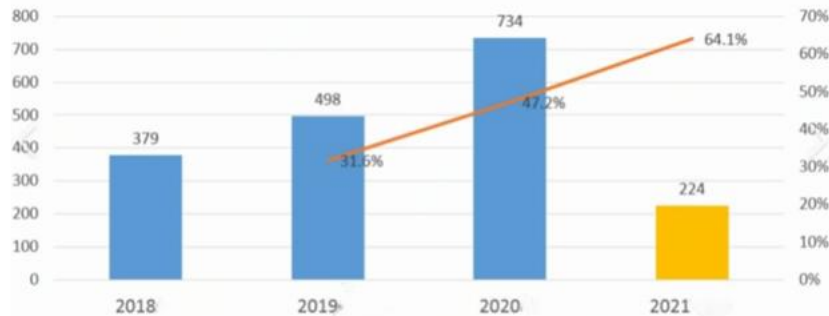


Figure 2: JD.com 's Logistics income growth

Blue indicates income (100 million), yellow indicates year-on-year growth.

It can be seen intuitively from the figure that the total logistics quota and its growth rate are far less than the growth rate of JD.com logistics. The success of JD.com logistics can be clearly seen from the above two charts.

4. Analysis of the problems in the process of JD.com 's logistics operation.

There are some problems and challenges in the operation of JD.com logistics.

The labor cost is relatively high. JD.com Logistics currently has a total of 259000 employees in the report, including more than 240000 front-line employees such as warehousing, express delivery and customer service. In the first three quarters of 2020 alone, the welfare expenditure of JD.com logistics front-line employees reached 17.9 billion yuan, accounting for 42 per cent of the total cost. The revenue scale is twice as large as JD.com, but it has only 114000 employees and 74000 front-line employees, and staff costs account for only 13% of the total cost. In the process of development, JD.com Logistics redistributes the movement path of goods before and after users place orders through self-built logistics, which effectively helps JD.com to reduce the time it takes for goods to reach users. However, this model also increases the operating costs of enterprises, which requires more human, material and financial investment.

The main business relies too much on its own platform. JD.com 's logistics prospectus does not disclose in detail the income and costs of each business (express delivery, express, cold chain, etc.). There is a high amount of related party transactions between JD.com Logistics and JD.com Group. JD.com Commodities will purchase a large number of warehouse logistics, advertising and other services from JD.com Logistics. The company's related transaction revenue in 2019 was 30.8 billion yuan, accounting for 62% of the total revenue.

The advantage of JD.com logistics is that the warehouse allocation capacity barrier is high, JD.com warehouse construction scale is ahead of Tongda express company, and the vast majority belong to JD.com Group. But it also means that JD.com Logistics has a large investment in warehousing facilities, and needs continuous capital investment to maintain this advantage. JD.com Logistics provides customized supply chain services with higher barriers and more difficult to expand. This model needs more professionals and higher level of operation and management, and has higher requirements for the operation ability of enterprises.

In the continuous expansion of the six major industries of fast consumer, clothing, home appliances and furniture, 3C, automobile and fresh, JD.com Logistics, although the number and income of customers in the integrated supply chain have increased significantly, but how to maintain this growth trend and how to deal with market competition? it is also a problem that JD.com Logistics needs to face.



Generally speaking, JD.com logistics has certain challenges and problems in the process of operation. It is necessary to constantly optimize the business model and improve market competitiveness while maintaining its own advantages.

5. The logistics system design of JD.com logistics enterprise

5.1. Scheme design and analysis

The logistics industry has always accounted for a relatively high proportion of China's GDP. Data show that the total cost of social logistics in 2019 is 14.6 trillion yuan, an increase of 7.3% over the same period last year, and the growth rate is 2.5% lower than that of the previous year. The ratio of the total cost of social logistics to GDP was 14.7%, down 0.1% from the previous year. From January to July 2020, the total cost of social logistics was 8 trillion yuan, down 2.4 percent from the same period last year, or 1.6 percentage points lower than in the first half of the year. It can be seen that the scale of the logistics market is so huge that it is better than Shunfeng, and its total annual revenue only accounts for less than 10% of the country's total logistics scale. The future development trend of the logistics industry is mainly reflected in the following points: first, the further improvement of industry concentration, the development of the logistics industry has initially formed a relatively clear competition pattern. There are many enterprises in the industry, but most of them are small. The overall industry concentration will gradually increase, forming the market division pattern of several large-scale specialized logistics enterprises. Second, the development of informatization and the application of new technologies have been further improved. at present, most logistics enterprises in China have relatively extensive management, low degree of informatization, and poor capacity planning capacity, resulting in low efficiency and high expense rate. In order to improve their competitiveness, logistics enterprises must focus on reducing costs and increasing investment in the application and management level of information technology. With the upgrading of network information technology, new technologies in the industry, new business type continue to emerge, as well as the continuous development of information technology and supply chain management and widely used in the logistics industry. Third, further develop the third-party logistics mode. in developed countries, third-party logistics has become the mainstream trend of modern logistics development. under the third-party logistics mode, upstream and downstream enterprises entrust logistics to third-party management. it can not only reduce capital investment, but also improve service quality and reduce logistics costs. Fourth, services continue to extend to both ends of the supply chain. another trend of the future development of the logistics supply chain industry is to gradually extend services to both ends of the supply chain, deepening the cooperation between upstream and downstream manufacturing enterprises, from simple third-party logistics, gradually expand to fully involved in all stages of enterprise production and sales, and through the integration of upstream and downstream information of the supply chain. Establish a collaborative partnership of common interests throughout the supply chain.

5.2. Brief introduction of scheme design

In modern logistics, logistics distribution is not composed of a single service mode, but includes a series of activities such as merchant preparation, commodity storage, tally, sorting, distribution and delivery, which are all indispensable parts of logistics distribution.

Mainly from the classification, warehousing, logistics and distribution, intelligent equipment. Purchasing part: reasonable planning of the location of the warehouse, reasonable layout within the warehouse. Warehousing plays a vital role in logistics and distribution, but in modern logistics and distribution, warehouse is no longer a space for long-term storage of goods, but an important bridge connecting suppliers and demanders. From the demand side, the warehouse should try its best to meet the needs of customers with a more flexible and timely process. For suppliers, warehousing should be more efficient in order to achieve maximum benefits in circulation and processing, inventory management, transportation and distribution. Therefore, modern logistics advocates the flow of products, which not only speeds up the operation and management of the warehouse, but also reduces the cost of logistics storage to a certain extent. The logistics part of the production system: on the one hand, through the automatic identification of the production line, the early warning information of the production line is automatically sent and the information display equipment in the warehouse is displayed in real time. On the other hand, improve the logistics safety management system: strengthen the supervision and



management of logistics enterprises and daily safety spot checks, and promote enterprises to strictly implement the main responsibility of production safety. Finally, build a modern logistics system, promote logistics to improve quality, increase efficiency and reduce costs, speed up the integration of logistics hub resources, improve the modern logistics service system and make up for commodity logistics, rural logistics, cold chain logistics, emergency logistics, aviation logistics shortcomings and so on. Finished product logistics part: to build a modern logistics system with the adaptation of supply and demand, internal and external connectivity, safe and efficient, intelligent and green. The customer opens the sorting interface of the production line, and the system automatically grabs and completes the analysis and decomposition, so as to produce the delivery plan of the finished product, print the invoice automatically, and automatically arrange the number of forklift to complete the loading and unloading of the product. and track the vehicle on the way and arrival.

6. Feasibility analysis of scheme design

The feasibility analysis of JD.com logistics system can be carried out from the following aspects:

First, JD.com Logistics relies on JD.com Group, has huge JD.com self-order resources, but also has business flow demand, these resources are conducive to the development of JD.com logistics and enhance its competitiveness.

Second, JD.com Logistics plans to use the funds raised from the listing to upgrade and expand the logistics network, so as to further enhance the comprehensive logistics strength.

Third, JD.com Logistics has much room to improve the penetration rate of the third-party sellers of JD.com Group. For example, in flat screen TVs, hands. In the categories of machines, bedding, ceiling lights and wardrobes, the penetration rates of JD.com logistics are 5.9%, 0.8%, 19.2%, 0.5% and 0.7%, respectively. More third-party sellers still choose three links, home appliances leading the United States, Haier chooses to use an Neng. This shows that JD.com Logistics still has great potential in expanding market share. JD.com logistics has a low penetration rate in JD.com Group, such as flat panel TV, mobile phone, bedding, ceiling lights, wardrobe and other categories, JD.com logistics penetration rate is 5.9%, 0.8%, 19.2%, 0.5%, 0.7% respectively. This shows that JD.com logistics still has a lot of room for improvement.

Fourth, the logistics business of JD.com Logistics is independent and open, with an obvious purpose, that is, to release logistics capacity, so as to achieve the purpose of saving unit cost and increasing profit. Although the gross profit margin is low, JD.com Logistics makes a systematic analysis on the current situation and problems of e-commerce logistics distribution, and puts forward five strategies to promote the optimization of e-commerce logistics mode. such as strengthening the risk prevention and control of e-commerce logistics, speeding up and improving infrastructure construction, implementing the "last kilometer" strategy of e-commerce logistics, vigorously training multi-level professionals, and improving the legal construction of e-commerce logistics [3].

7. Design Summary

JD.com Logistics has made a lot of achievements, which not only improve the logistics efficiency, but also optimize the customer experience. They have made breakthroughs in technological innovation, service upgrading and green logistics, such as the application of intelligent warehousing and automatic sorting system to significantly improve the speed and accuracy of cargo processing. At the same time, JD.com Logistics has also strengthened its cooperation with domestic and foreign logistics networks, expanded the scope of services, and made cross-border logistics more convenient and efficient. In terms of service, JD.com Logistics continues to optimize the distribution process and introduces a variety of distribution options, including regular distribution, night distribution and so on, to meet the needs of different customers. In addition, they have strengthened after-sales service to ensure that customers can quickly respond to and solve problems when they encounter problems. In terms of green logistics, JD.com Logistics actively responds to the national environmental protection policy, promotes the use of environmentally friendly packaging materials, reduces carbon emissions in the process of logistics, and strives to achieve sustainable development.

Looking to the future, JD.com Logistics will continue to adhere to innovation-driven, deepen the application of technology, and improve the intelligent level of logistics. At the same time, they will also pay attention to industry trends, such as cross-border e-commerce, rural e-commerce and other emerging areas, and constantly



adjust and optimize their strategic layout to adapt to market changes and needs. JD.com Logistics aims to become the world's leading supply chain solution and logistics service provider, contributing to the prosperity and development of JD.com Group and even the entire e-commerce ecosystem

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