

# Exploring competitive advantages in enterprise supply chains: a case study of JD's predictive and logistics links

Zexin Li<sup>1</sup>, Zishan Shu<sup>2</sup>, and Xiaoyu Wang<sup>3,\*</sup>

<sup>1</sup>Wuhan University of Science and Technology, School of Management, Wuhan, 442000, China

<sup>2</sup>Chongqing Technology and Business University, School of Economics, Chongqing, 400064, China

<sup>3</sup>Chongqing Institute of Foreign Studies, School of International Business and Management, Chongqing, 401120, China

**Abstract.** In today's fiercely competitive business landscape, enterprises strive to enhance their competitive advantage. One crucial aspect of achieving this is by optimizing their supply chain practices. This paper presents a comprehensive analysis of Jing Dong (JD), a prominent e-commerce company, as a case study to delve into its supply chain technologies. By examining the specific technologies implemented by JD and elucidating their positive impact on the company's performance, this study establishes a robust theoretical foundation for further research. It offers a practical model for companies seeking to improve their supply chain practices. By adopting and adapting similar technologies and strategies, enterprises can unlock new opportunities, streamline operations, and ultimately gain a sustainable competitive edge in their respective industries. Through a deeper understanding of JD's successful supply chain approaches, companies can strategically enhance their capabilities and thrive in the dynamic market environment.

## 1 Introduction

The supply chain is an organizational form oriented towards the company's profitability or market demand, aims to improve product quality and production efficiency, and integrates resources to achieve efficient collaboration throughout the production process. With talent, cost and productivity, supply chain management constitutes the four key drivers of manufacturing competitiveness [1]. The article by He gives some suggestions on supply chain adjustment and advice enterprises to reposition themselves, reorganize the channels and networks of the supply chain, and develop new standards for the supply chain at a macro level [2]. In an article by Zhao, he gives suggestions on supply chain optimization, encouraging supply chain innovation and improving the level of autonomy and controllability of the supply chain, but more on the security of the industrial chain supply chain [3]. On the other hand, Yang mentioned in his article the importance and inevitability of enterprises establishing supply chains [4]. The advice given in the above articles is about improving the supply chain itself, but not from the enterprise's perspective. It needs to be clarified that the enterprise's competitive advantage can be improved by improving the value of the supply chain. It also needs to be more specific about what aspects of the supply chain should be improved and enhanced, and no specific directions or recommendations can be used. This paper analyses and summarises companies that have made achievements in their supply chains and suggests

feasible ways to improve them and enhance their competitive advantage.

## 2. Case description

JD Group began construction of its logistics in 2007 and formally established JD Logistics Group on April 25, 2017. China's top technology-driven provider of logistics services and supply chain solutions is JD Logistics. Service provider for supply chain infrastructure.

Six highly collaborative networks are in place at JD Logistics, including a storage network, an integrated transportation network, a distribution network, a large-scale network, a cold chain network, and a cross-border network. encompassing almost all of China's regions, cities, and people. The bar for logistical assistance has been raised. By 2020, JD Logistics will continue to lead the industry in customer experience by assisting 90% of JD's online retail orders with same-day and next-day delivery. Including the space of cloud warehouses, JD Logistics operates and manages a total warehouse area of around 30 million square meters as of December 31, 2022. JD Logistics currently operates over 1,500 warehouses across the country.

Storage and distribution, express delivery, large item, cold chain, and cross-border services are the primary service categories offered by JD Logistics. Its integrated business approach enables it to provide all of its customers' supply chain needs in a single location, enabling them to concentrate on their core businesses by

\* Corresponding author: 196061405@mail.sit.edu.cn

assisting with inventory management optimization, cost-reduction initiatives, and resource reallocation.

JD Logistics has long valued the contribution that technical innovation makes to business growth. JD Logistics consistently enhances its automation, digitization, and intelligent decision-making skills based on underlying technologies including 5G, artificial intelligence, big data, cloud computing, and the Internet of Things. Through automatic handling robots, sorting robots, and intelligent delivery vehicles, it has not only significantly increased its efficiency in warehousing, transportation, sorting, and distribution, but it has also created its own warehousing, transportation, and order management systems to support its clients. In order to assist clients in fully digitizing their supply chains and to facilitate decision-making in areas like sales forecasting, merchandise distribution planning, and supply chain network optimization, the company has also developed its own warehousing, transportation, and order management systems, among other things. JD Logistics has created a comprehensive intelligent logistics system that automates services, digitizes processes, and makes wise decisions using these exclusive technologies. JD Logistics maintained 43 "Asia One" large intelligent warehouses in China as of December 21, 2021.

By utilizing its management system, planning capabilities, business standards, and industry experience, JD Logistics launched an innovative cloud warehousing model in 2017. This model allows small and medium-sized logistics businesses to fully utilize JD Logistics' resources while enabling third-party warehousing, increasing the utilization rate of unused warehouses. Currently, there are more than 1,500 cloud-based warehouses using the environmentally friendly JD Cloud Warehouse technology. With 32 foreign warehouses and warehouses, a "double 48-hour" punctuality service, and collaboration with local and international partners, JD Logistics will have established international routes covering more than 220 countries and regions by the end of 2020. This will guarantee that shipments can be delivered from China to the receiving country within 48 hours. This allows for the 48-hour delivery of goods from China to the destination nation and to local consumers. The "Qingliu Project," a strategic initiative being worked on by JD Logistics, is focused on "Environment," "People," and "Economy." The project's three domains—"Environment," "People," and "Economy"—all center on the sustainable development of people in partnership with business and society.

### **3. JD intelligent prediction**

#### **3.1 JD intelligent prediction technology**

In modern business, intelligent technology has become an important trend. Among them, the emergence of JD's intelligent prediction technology will have a profound impact on business and become an important representative of business technology innovation. Lv

pointed out that the intelligent prediction of logistics supply chain adopts the method of integrating artificial intelligence with the Internet of Things, 5G, satellite communication, industrial Internet and theories of control science, operations research, etc., and takes the container logistics supply chain as the starting point to build the supply and demand prediction model, early warning model, dynamic programming adjustment strategy, etc [5]. It takes the container logistics supply chain as the starting point to build the supply and demand prediction model, early warning model, dynamic programming adjustment strategy, etc. of the logistics industry to achieve efficient integration of all links in the logistics supply chain system, improve intelligent processing and control capabilities, address data gaps, low efficiency, high carbon emissions and intelligent security issues in the logistics supply chain field, form unified information and data exchange standards between different units, and ultimately achieve predictive planning, efficiency and security improvements in the operation of the logistics supply chain system.

The main role of JD's intelligent forecasting technology is to analyze and forecast the future market trend by collecting Market data so businesses can more accurately grasp the market dynamics and timely launch products or services that adapt to the market, thus improving sales performance. The research and application of this technology can be traced back to the 1960s. In today's information age, with the help of Big data, artificial intelligence and other technical means, its application scope has been greatly expanded.

In JD Mall, the application of intelligent prediction technology covers various aspects, including product management, order management, logistics management, etc. JD skillfully uses GMV prediction (website transaction amount prediction): to predict the development of GMV in the future for some time and support the Granularity of goods. By accurately predicting GMV, businesses can better develop financial plans and marketing strategies and improve operational efficiency. Taking product management as an example, JD predicts users' preferences and needs for purchasing products through a comprehensive analysis of user purchase data, providing targeted product recommendations for merchants, and making reasonable plans for product listing time, prices, etc., ultimately achieving maximum sales and profits.

#### **3.2 The impact of JD intelligent forecasting on the supply chain**

The impact of JD Intelligent Forecasting on the supply chain is mainly reflected in optimizing demand, inventory, and production efficiency. Through machine learning algorithms and deep learning technologies, JD Intelligent Supply Chain System can model historical data, analyze data in real-time, and make more accurate decisions, optimizing the supply chain and improving its efficiency and accuracy. According to statistics, JD's

intelligent prediction technology has been widely applied on the JD platform, bringing significant sales growth to merchants. For example, during the 2023 JD 618 period, the coverage rate of products predicted through JD intelligent prediction technology reached 95%, and the prediction accuracy reached 93%. By accurately predicting user demand and sales trends, merchants can more efficiently stock and deliver goods, meeting user needs and increasing sales. The impact of JD Intelligent Forecasting on the supply chain is mainly reflected in the following aspects:

### 3.2.1 Prediction Model

JD Intelligent Forecasting uses machine learning algorithms and deep learning technologies to model historical data and predict future demand, prices, inventory, etc. These prediction results can help JD's intelligent supply chain system better plan the supply chain, optimize inventory management, improve production efficiency, and reduce waste. JD Intelligent Forecasting can accurately predict the market demand and adjust each supply chain link according to the demand. This avoids oversupply or oversupply losses caused by inventory backlog for enterprises.

### 3.2.2 Real-time Data Analysis

JD Intelligent Forecasting not only predicts future demand but also analyzes historical data in real-time, including inventory levels, order volumes, prices, etc., to optimize the supply chain. Through real-time data analysis, JD's intelligent supply chain system can more quickly identify problems, make decisions, improve the efficiency and accuracy of the supply chain, enable enterprises to grasp market dynamics better, quickly adjust production and sales strategies, and better meet the needs of consumers.

### 3.2.3 Automated Decision-making

JD Intelligent Supply Chain System can model historical data through automated decision-making technology and use predictive models and real-time data analysis results to make more accurate decisions. It can also help enterprises discover and solve potential problems by mining information in the supply chain. For example, predicting supplier supply time and product quality and optimizing logistics. For example, the system can automatically determine whether the inventory is too high or Predict market demand according to the order quantity to make more optimized decisions.

## 4. JD logistics

### 4.1 Introduction to JD logistics technology

Currently, the composition of JD's supply chain nodes is more complex, with six supply chains, namely small and medium-sized items, large items, cold chain, cross-border, B2B and crowdsourcing, forming a complex

mesh structure. Based on AI and big data technologies, JD continues to develop related technologies to build the JD Smart Business Body. JD logistics technologies cover smart warehousing, smart transportation, smart logistics management systems, big data processing, blockchain technology, etc. These technologies can improve logistics management efficiency, reduce logistics costs and improve the security and reliability of logistics information [6]. JD Logistics technologies include the following.

#### 4.1.1 Intelligent Warehousing

RFID intelligent storage solutions are a cutting-edge technology used by JD in intelligent logistics. RFID is a non-contact automated identifying technology that may be used in a variety of complicated contexts. RFID electronic tags are used to replace the original commodity barcodes, and it is based on RFID batch and RF non-visual distant reading capabilities. According to data projections, RFID intelligent warehousing solutions will increase the warehouse inventory efficiency by more than 20%. JD Logistics is continuing to study the scenarios applicable to RFID, the technology will be developed more practically, and the new upgraded intelligent brain, which is a large WMS system, will give full play to the application of the technology in the field of warehousing advantages. JD Logistics is the first to use RFID technology to introduce supply chain logistics scenarios, drastically decreasing the workload on personnel, increasing productivity, and achieving batch inventory. The employees may wave goodbye to the strenuous physical labor of one-by-one inventory thanks to inventory efficiency that is more than ten times more than that of the conventional mode of operation. This is also beneficial for the stability and improvement of the supply chain for New Year's Eve items. Through the intelligent storage system, JD Logistics can achieve automated stacking and storage, automated picking and automated distribution operations, improving warehouse management efficiency and reducing manual operation costs [7].

#### 4.1.2 Intelligent Transportation

Liu Qiangdong, CEO of JD Group, has said that in the next ten years, JD retail will develop in unmanned logistics, personalized finance and insurance, and intelligent retail. He said, "JD will achieve unmanned and intelligent logistics through AR/VR technology, in-depth learning of robot automation, artificial intelligence and other innovative technologies to improve user experience while continuously reducing industry and social operating costs, and eventually develop into a truly intelligent business entity." From this, it can be seen that JD Logistics uses intelligent transportation systems, which can realize the application of intelligent vehicles such as self-driving vehicles and drones to improve transportation efficiency and reduce transportation costs, and through the logistics management system, can realize real-time monitoring of

logistics information, optimal allocation of logistics resources, etc. to improve logistics management efficiency [8]. At the same time, through big data processing technology, JD Intelligent Transportation will analyze massive logistics data, tap the value of the data and improve the efficiency of logistics decision-making.

#### 4.1.3 Blockchain Technology

Based on the information network formed by the anti-counterfeiting traceability platform, JD selects suitable suppliers to ensure that the products meet the procurement expectations and then reaches a strategic partnership with the suppliers to achieve strategic procurement. Under the condition that both parties have a cooperative relationship, the quality of goods procured through strategic procurement can be effectively guaranteed. At the same time, the backlog of product inventory due to after-sale returns can be avoided to the greatest extent. Consumers' needs are increasingly diversified and personalized, and JD needs to purchase a wide range of products to meet consumers' needs. Strategic sourcing helps it to form a high-frequency, low-volume, continuous and stable product purchase, thus reducing the amount of inventory and achieving the "right amount" of procurement. At the same time, the platform transmits information about the entire chain from raw materials to the retail terminal to each node through broadcasting, making information transfer between the various links more agile so that the production departments of each enterprise are more responsive to information. As a result, the purchasing department has a good understanding of the production of products in the upstream production department, and instead of purchasing to replenish inventory, the purchasing department can make JIT purchases as needed so that the company does not have a backlog of inventory due to impulsive purchases, nor does it run out of stock due to late purchases. JD Logistics uses blockchain technology to achieve decentralized storage and transmission of logistics information and improve the security and reliability of logistics information [9].

## 4.2 The impact of JD logistics on the supply chain

### 4.2.1 Cost Savings

JD Logistics managed more than 1,500 warehouses across the country as of December 31, 2022, with a total warehouse network management area of more than 30 million square meters. RDC, FDC, big central warehouse, large satellite warehouse, book warehouse, city warehouse, etc. are some of the functional divisions that may be made for these warehouses. RDC (Regional Distribution Center), which may be thought of as a major warehouse, is often built up in key cities with a wide coverage area and is where items acquired from suppliers are transported first. Forward Distribution Center) is a regional distribution center that serves as a secondary warehouse and serves several small and

medium-sized towns as well as rural regions. Products are often distributed from the RDC in accordance with demand. JD has a huge advantage in warehousing costs and product timeliness through a large and complete warehousing system and RFID technology.

### 4.2.2 Improvement of Distribution Efficiency

JD.com has taken many scientific and technological measures to improve the distribution system. Based on the strong investment in supply chain infrastructure and technology over the past ten years, JD Logistics has established intelligent supply chain systems for daily service and disaster emergency response under the guidance of the 3S theory of "short chain, intelligence and symbiosis" [10]. During the epidemic, the unmanned distribution products of JD Logistics have played an indispensable role. Drones, distribution robots and other products have been operating normally in many parts of the country. Through unmanned distribution technology, JD.com leads the industry in breaking through road restrictions (UAVs), saving labor costs, and improving distribution efficiency.

### 4.2.3 Improve Customer Trust

One of the few major corporations with a wide range of use cases for blockchain technology is JD. The first iteration of the "JD Blockchain Technology Practice White Paper" was produced by JD Group in March 2018. JD Group issued the first iteration of the "JD Blockchain Technology Practice White Paper" in March 2018, announcing for the first time to the industry JD's determination and confidence in laying out "China's independent intellectual property blockchain technology", which drew widespread attention from the industry and was officially downloaded more than 50,000 times. In the future, organizations and individuals in the supply chain need to complete multi-party transactions and information sharing and exchange under the premise of mutual trust to improve the efficiency of the entire supply chain. Blockchain technology can play a positive role in ensuring the authenticity of information, improving the trust of various entities and linking them together to improve efficiency.

## 5. Conclusion

By analyzing the technical and commercial aspects of prediction and logistics in JD's supply chain, we can enhance the value of the supply chain from three aspects: supply chain technology research and development, rational utilization of data, and enterprise cooperation, thereby increasing the competitive advantage of the enterprise. First, the intelligent prediction of the supply chain is to build a prediction model through Big data, the Internet of Things, artificial intelligence and other technologies. In the prediction system, historical data can be analyzed. Real-time analysis can be carried out through artificial intelligence and other technologies to achieve information exchange, and the entire supply chain can be intelligently processed and controlled. In

JD Logistics, warehousing, transportation, and management are all improved through automation technology to improve logistics efficiency. In the transportation process, autonomous driving technology is applied to reduce transportation costs, ultimately improving the efficiency and safety of the supply chain. Technology is a prerequisite for the continued development of the supply chain. Secondly, the supply chain prediction system collects sales volume, price and other data based on technology and analyzes consumer consumption preferences, inventory issues of enterprises, logistics information, etc. By integrating all data, it excavates data value, timely adjusts future product trends and procurement and inventory issues, and discovers potential supply chain problems and optimizes them. Reasonable use of data can control priority. Thirdly, strengthening cooperation between enterprises is also crucial. In every supply chain link, cooperation with other enterprises is indispensable. Through strong technological alliances and professional complementarity, enterprises can achieve win-win results. Enhancing the supply chain's value strengthens the supply chain's resilience, which is also an advantage that enterprises can compete with.

### **Authors contribution**

All the authors contributed equally,  
and their names were listed alphabetically.

### **References**

1. M. Gu, B. Huo, Supply Chain Mgt. **01**, 58 (2020)
2. M. He, Agric. Mach. Market **07**, 31 (2020)
3. W. Zhao, People's Post Telecom. **5**, (2023)
4. J. Yang, China Ind. Informat. **03**, 52 (2023)
5. J. Lv, Y. He, Logistics Tech. **07**, (2022)
6. Y. Qian, Econ. Mgt. Sci. **11**, (2020)
7. R. China Storage Transp. **3**, (2021)
8. C. Xi, Logistics Tech. Appl. **10**, 22 (2017)
9. Y. Sun, X. Lu, Finance Acc. **21**, (2021)
10. P. Sun, Robot Ind. **05**, 56 (2022)