

Platform-based versus Self-operated Logistics Supply Chain Models: A Comparative Case Study of Cainiao and JD Logistics

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Abstract

In recent years, the rise of e-commerce led to development of different supply chain management models. Although previous research has explored digital supply chains, few studies have compared different logistics models. This study selected two Chinese logistics companies, Cainiao Network and JD Logistics, to compare and analyze their supply chain structures. The study is a comparative case study which uses secondary data to examine different logistics aspects of these two companies. The results show that Cainiao Network uses its platform to integrate resources by collaborating with merchants and companies, achieving flexible operation and efficient resource allocation; while JD Logistics ensures the reliability of order delivery and service quality through self-built infrastructure and independent operational control. The study concludes that these two models offer unique competitive advantages for each company, but also have certain drawbacks. Companies should adjust according to their own needs, such as reducing control or increasing flexibility, to improve logistics efficiency.

Key words

Supply Chain Management, Logistics Models, Platform-Based Logistics, Self-Operated Logistics, Comparative Case Study.

1. Introduction

Supply chain management is an essential part of business operations, ensuring goods and services to be

delivered on time, and generating revenue for business. In traditional business settings, supply chain management focused on reducing production and transportation

costs, while companies manage procurement, warehousing, distribution, and information separately, and with little coordination. However, e-commerce evolved rapidly and has changed the way logistics operate [1]. Logistics and supply chains are now adopting technologies like big data, artificial intelligence and the Internet of Things (IoT) to their operations to deliver goods faster [2].

The advancement of technology has gradually changed the way of shopping and indirectly influenced supply chain and delivery models. Studies have examined various logistics models such as vertically integrated supply chains, third-party logistics, and platform-based models. However, most studies tend to focus on single companies or specific logistics strategies as case studies, but did not compare them. In particular, there is a lack of comparison on how different governance structures affect various aspects of supply chain. Therefore, this study aims to fill this research gap by comparing Cainiao Network and JD Logistics, two Chinese logistics providers that have different logistics models. The study takes academic literature, company website profiles and annual reports as references, and it is a comparative case study. The study will examine each company in areas like supply chain coordination, warehousing and inventory management, and information integration and digital technology. This research hopes to gain a deeper understanding of the advantages, disadvantages, and implication of each approach. It will also identify problems and make recommendations in order to provide insights for stakeholders in the logistics and supply chain industry.

2. Cainiao Network

2.1 Company Profile

Cainiao Network Technology Co., Ltd. was established by Alibaba Group in May 2013 [3]. Cainiao is a subsidiary of Alibaba Group responsible for global smart logistics and integrated supply chain solutions [1]. Cainiao does not directly own and operate most logistics assets, but they have integrated various resources to make supply chain operations more coordinated and efficient [4]. Cainiao has been serving more than 200 countries and regions worldwide and providing end-to-end

logistics solutions for merchants, brands, and consumers [3]. The company has also introduced international standards for delivery such as Global 5-Day Delivery and Global 10-Day Delivery, which reflects the company's ability to deliver efficiently [3].

In 2015, Cainiao launched the "Three Networks and Two Edges" strategy to strengthen the collaboration among enterprises, logistics companies and other companies [3]. The "Three Networks" refers to express delivery, warehousing & distribution and last-mile delivery, which are used in urban and rural areas and international markets (Two Edges) to ensure that goods can be delivered to all locations [3]. Subsequently, Cainiao established its first overseas electronic World Trade Platform (e-Hub) in Kuala Lumpur, Malaysia, in 2017 [3]. This allowed Cainiao to enter international e-commerce. Since then, the company expanded its business to Europe, Asia, the Americas and other regions, and they added more logistics centers and international transportations [3].

2.2 Case Description

2.2.1 Logistics and Supply Chain Coordination

Cainiao is a typical fourth-party logistics (4PL), that outsources logistics and supply chain management to external service providers, rather than a traditional logistics operator. Cainiao does not own vehicles or conduct large-scale deliveries. Instead, the company uses China Smart Logistics Network (CSN), a network that connects courier companies with merchants and enterprises, as well as partnering with warehouses, technology providers, and distributors [5, 6]. In logistics delivery, Cainiao collaborates with major logistics companies such as SF express, STO, YTO, ZTO, and Yunda to support large-scale e-commerce activities [5]. In terms of last-mile delivery, the company has set up many pick-up and drop-off points ("Cainiao Stations") and community service stations. Therefore, Cainiao belongs to a shared logistics ecosystem, a platform that integrates information, logistics and warehousing resources from different companies.

2.2.2 Warehouse and Inventory Management

Cainiao has developed a dual-network warehouse system which consists of physical warehouses (“Ground Network”) and a digital inventory management system (“Sky Network”) [5]. Cainiao has built physical warehouses and partner facilities in many cities. The company also introduced the concept of virtual warehousing, where merchants upload inventory and warehousing data into the Cainiao platform [5]. This move aims to use big data to predict demand in different regions and allocate inventory accordingly. This could make order fulfillment more efficiently and avoids inventory redundancy. By applying this digital system, Cainiao is able to achieve 24-hour delivery targets nationwide.

2.2.3 Information Integration and Digital Technology

A study by J. Chen indicates that Cainiao handles 70% of China's daily parcel deliveries, which includes 7 trillion data messages [5]. Furthermore, Cainiao possesses information on 180,000 express delivery outlets and 6.09 million logistics delivery routes, and more [5]. This shows that Cainiao logistics is able to achieve end-to-end intelligent operation with the support of large quantity of data. Cainiao has incorporated cloud computing, big data analytics, and Internet of Things (IoT), and more recent technologies in operations [6]. For instance, Cainiao partnered with Nestlé in 2015 to develop a Smart Supply Chain Brain [6]. Then, Cainiao launched its own logistics cloud platform and used blockchain technology to build a cross-border logistics tracking system [6].

3. JD Logistics

3.1 Company Profile

JD Logistics, Inc. first started as an internal logistics business within JD.com in 2007, and later became an independent entity in 2017 [7]. The company claims that it was founded to address the early shortcomings of poor reliability in early Chinese logistics [7]. Unlike third-party logistics, JD Logistics invested heavily in self-operated logistics which provides end-to-end supply

chain solutions for businesses across multiple industries, covering procurement, inventory management, order fulfillment, delivery, and after-sales logistics [7].

The company's early strategy involved establishing a nationwide warehousing network to directly manage inventory and shorten delivery cycles. Simultaneously, the company integrated warehousing, transportation, and last-mile delivery, and under a unified management system, the company launched same-day and next-day delivery services in multiple Chinese cities. In the following years, JD established other businesses like consumer goods, electronics, healthcare, manufacturing, and fresh food retail, in order to provide more comprehensive logistics and supply chain solutions [7]. In 2021, JD Logistics completed its initial public offering (IPO) on the Hong Kong Stock Exchange, which allowed the company to obtain financing from the capital market, and begin to gradually expand its scale that year [7].

As of now, the overseas operations of JD Logistics have covered more than 12 foreign countries and regions. The company has operated more than 1600 warehouses with a total area over 34 million square meters [7]. JD Logistics continues to collaborate with airlines, shipping companies, customs agencies, and international logistics providers to expand its global network.

3.2 Case Description

3.2.1 Logistics and Supply Chain Coordination

JD Logistics follows a vertically integrated supply chain model. Initially, JD relied on third-party logistics providers, but due to poor service quality, the company decided to build its own logistics system in 2007 [8]. In addition, JD has developed other types of supplier cooperation models like FBP, LBP, SOPL, and SOP [8]. JD mainly uses the FBP model, which controls operational aspects such as warehousing, delivery, customer service, invoice processing and more [8]. In other models, JD reduces its involvement to a certain extent and then transfers some operational responsibility to suppliers. This structure allows JD to balance operational control and supplier participation [8].

3.2.2 Warehouse and Inventory Management

JD Logistics has a large amount of self-built infrastructure, and manages its own warehouses, distribution centers, transportation, and logistics system [8]. This allows JD to directly control inventory, order processing, and fulfillment processes. Research shows that in 2017, JD could deliver about 90% of orders directly within two days, a feat its competitors could not achieve [9]. In its supply chain strategy, the company applies Just-In-Time (JIT) inventory management to optimize its procurement, thereby reducing inventory costs [8, 9].

3.2.3 Information Integration and Digital Technology

JD's information infrastructure focuses on the internal operation of its logistics network and how to further optimize it. The company developed intelligent supply chain platforms, demand forecasting systems, inventory and management tools, and customer analytics. Furthermore, research indicates that JD, along with companies like TCL and Nestlé, has launched consumer-to-manufacturer (C2M) projects to gather customer feedback and create products that meet their tastes [9]. This reflects that JD is willing to build long-term relationships with merchants and customers.

4. Comparative Analysis

4.1 Logistics and Supply Chain Coordination

Cainiao coordinates with various organizations through its digital platform to make logistics and distribution as well as supply chain sourcing more flexible. JD Logistics, on the other hand, is a vertically integrated logistics model which controls supply chain activities to ensure efficiency and service quality. The differences between Cainiao and JD can be explained by the Transaction Cost Economics. According to this theory, when the cost of collaborating with external partners exceeds the cost of working internally, the firm will choose to internalize activities [10]. Because JD had previously reported issues on service instability when working with third-party logistics providers, they chose to internalize its logistics operations and transform towards vertical integration. Conversely, Cainiao provided an open platform that partners with several logistics participants to

reduce transaction costs. In terms of supply chain, JD values long-term relationships with suppliers to ensure quality of procurement; while Cainiao attracts different merchants to obtain goods and integrates customer orders to reduce transaction costs. In short, JD uses a hierarchical control system, while Cainiao operates through digital coordination, both reduce transaction costs in their own way.

4.2 Warehousing and Inventory Management

From the perspective of Resource-Based View (RBV), companies may use a valuable resource as a strategic weapon to gain a competitive advantage [11]. JD views warehouse infrastructures and ownership as an advantage, and therefore use these advantages to enhance service reliability to resolve their previous issues. JD Logistics relies on its self-built warehousing and distribution centers to manage inventory and delivery, while Cainiao combines its own warehouses and virtual inventory systems, with the assistance of merchants and third party logistics to coordinate inventory online. Therefore, JD's centralized warehousing structure provides greater control over inventory management, allows the company to standardize warehousing processes and coordinate inventory decision with transportation and distribution operation. In contrast, Cainiao's warehousing model provides greater flexibility in inventory allocation, the inventory can be dynamically repositioned across the network to fit the regional demand. This will reduce the redundancy in filing inventories, and improve the warehouse utilization.

Furthermore, the two firms take different performance goals. The comparison suggests that JD focuses more on order fulfillment and reliability of the delivery, and Cainiao prefers to use network and platform to make the delivery more flexible.

A similar idea regarding the effect of the corporate and the market environment on the work operation is put forward by Christopher (2000) [12]. JD's centralized control means that the focus of the organizational system is agility. Cainiao represents the flexibility which focuses on the automation and the rapid change.

4.3 Information Integration and Digital Technology

The two companies apply technology in different ways and for different purposes. For example, to Cainiao, the digitalization use to facilitate the coordination among multiple independent organization. Whereas for JD, the purpose is to improve business operation more efficiently and create decision making opportunities by using the vertically integrated logistics network. So the scope of information integration is different for the two companies. For Cainiao, the digital platform connects the merchants, warehouses, logistics provides and consumers through information sharing. The information of the digital platform is the flow of information between different parties. By using the information on the platform, the multiple parties can sync the information of inventory, order status and logistics. Then they can improve the coordination without having to directly own the logistics resource. And the platform ecosystem theory shows that, the strategy of Cainiao is that digital platform can connect the multiple independent participants (e.g. Merchants, warehouse. etc.) to create resource exchange and business interaction [13]. For JD, the digital technology is focused on the optimization of internal supply chain activities, such as procurement, inventory management, warehousing, transportation and the customer order fulfillment. For example, through the initiative of consumer to manufacturer (C2M), the customer demand information can be directly transmitted to the supplier and the manufacturer, which helps to adjust the production and inventory decisions according to the market demand.

4.4 Problems, Causes and Countermeasures

The comparison results show that, although Cainiao aggregates many independent logistics companies and service providers through its platform, it has not so much direct control of logistics execution. Although it has high flexibility and scalability, the fact is that logistics resources are still owned by different organizations, so the difference of operation standard, service quality, delivery speed, may cause the difference of all over the supply chain. Although Cainiao can coordinate logistics activities with digital platform, it can not really control

how its partner logistics companies do warehousing, transportation or last mile delivery. It may damage the customer experience and supply chain reliability. In fact, the problem is the high fragmentation of the ecosystem and difficult to maintain the logistics performance consistently. Therefore, the Cainiao needs to improve the company operation, they could set stricter platform policies and governance system. For example, the company can set the standard operating procedures for all company of partner, and the unifier performance indicators for all logistics partners. In addition, the company could invest more in artificial intelligence and blockchain technology to monitor the logistics performance.

JD Logistics is defined by the fact that it has a full control of its self-operated logistics system (warehousing, transportation, inventory management, and delivery activities) and long-term relations with suppliers. The vertically integrated structure of the company may lower the flexibility of the company in facing a sudden change in the market or a supply chain disruption. Indeed, because the processes of JD Logistics are strictly linked to the self-built of the JD logistics and the established operations procedures, most of the steps of its logistics are rather fix. In the case of some unwanted situation, it is not possible to change the delivery plans immediately, then there is relatively low flexibility. Moreover, JD Logistics is based on the long-term strategic relation with the suppliers to support the integrated supply chain operations. If a main supplier terminates the partnership, product supply will be disrupted and JD will need to replenish its inventory. It is time consuming to replace the strategic suppliers because the new suppliers have to be must strictly meet JD's needs. To address this, the company could make partnership with many qualified suppliers for the main category of products. This will reduce the dependence in one supplier and increase the resistance to the supply chain disruption Furthermore, JD can develop backup logistics plans, and when necessary, partner with logistics providers in rural areas in response to emergencies. So, the company could work with more suppliers and use contingency planning to enhance the flexibility of the supply chain.

Another issue is the trade-off between company expansion and operational control. For example, because of the digital platform, Cainiao can expand very rapidly because new logistics partners and merchants can be

added in the network, and there is not much investment in the infrastructure. With increased scale, controlling the business operations becomes more difficult. On the contrary, JD is a self-operated model, having strong control but requires more investment when the company expands to a new region or market. This can impede the expansion and increase the risk in the financial side. This issue stems from the nature of the two governance structure. Cainiao inherently relies on platforms and collaborations with multiple companies, so its network often has a coordination issue. For such a hierarchical system, like JD, it has the stronger control, but it has to invest and build all of its own infrastructure. Thus, the expansion needs more resources and investment. In reality, no one governance structure is perfect in a sense, no company can be very flexible, can expand rapidly and be completely controlled by itself. However, both of the companies can have the benefit of combine some part of the platform coordination and operational control in their business model. For example, Cainiao can choose a part of the logistics function which has very high service quality requirement, such as the cross-border fulfillment or the premium delivery, which can be internalized. Meanwhile, for JD, it may choose to outsource some non-core logistics activity, which does not matter for the customers experience.

5. Conclusion

This study compares Cainiao's platform-based logistics model and JD's self-operated logistics model from three dimensions: supply chain coordination, warehousing and inventory management, and information integration and digital technology. The results show that Cainiao and JD represent two different supply chain models. Cainiao is using the digital platform to integrate the logistics suppliers, the merchants, the warehouses and the distributors; it aims to promote the resource sharing for more flexible operation and faster expansion. JD Logistics is using the model which is more vertically integrated, the model that emphasizes the ownership and doing logistics activities themselves, in order to have more reliable service and enough inventory control. The difference between the two companies is the organization priorities. The goal of Cainiao is to make its operation flexible and scalable. JD is trying to

achieve the consistency and the quality by the internal control. So, neither model is better than the other one. The companies should choose in which kind of logistics strategy which they think is suitable for their market environment, according to the business objective, and according to the resources that they have. Both the companies could further improve the performance by using big data from their platform and by using some specific elements of the control of the operations. For example, for Cainiao, it could improve the service quality by internalizing some business processes. For JD, it could use the internet and the platform to develop backup logistics plans, and could outsource some non-core business process to other third party organizations in order to reduce the cost, for example.

This study also fills the gap in the current lack of multi-dimensional analysis of different models in the logistics industry as this study directly compares two Chinese logistics companies and gives a clear reference. Furthermore, this study also gives the recommendations for management assessments for supply chain and logistics person in the logistics industry, and also giving the practical references for e-commerce company in the selection of partner types. The limitations of this study are that the two companies only work in China and cannot show the logistics processes and models in other country, therefore, the results were not generalizable. Furthermore, this study also focuses mainly in the logistics and supply chain activities, which is not analyzing the outside factors that may have the impact. Future research could be including the companies from different regions and use a larger company sample to generalize the finding. Also, the external variables like government intervention and the environment would be helpful to explain the cause of this type of logistics model more deeply.

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