

# Research on the Impact of Heavy Asset Model on Supply Chain Elasticity

## -- Taking JD's Logistics Model as an Example

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### Abstract

From the epidemic in 2020 to the Omicron variant in 2022, the epidemic has had an impact on the logistics supply chain. The People's Bank of China, the Ministry of Industry and Information Technology, and others jointly issued the "Opinions on Standardizing the Development of Supply Chain Finance to Support the Stable Circulation and Optimization Upgrade of the Supply Chain Industry Chain", which pointed out that in the era of the epidemic, large-scale breaks in the logistics supply chain often occur, and the recovery time after the break is also relatively long. This project takes JD Group as an example, combined with the acceptance event of Jiashi JD Warehouse Logistics Closed Infrastructure Securities Investment Fund's application for infrastructure public REITs to the Shanghai Stock Exchange, and based on JD Group's relevant practices, it deeply explores the impact of the heavy asset model on JD's supply chain elasticity coefficient, summarizes useful experience in effectively improving supply chain elasticity, and fills the gaps in China's supply chain. And based on the development status and business models of other small and medium-sized enterprises, targeted suggestions are proposed to provide useful reference for other enterprises and promote the healthy and vigorous development of China's logistics industry.

### Keywords

Heavy asset model; Supply chain elasticity; JD Group.

### 1. Introduction

The Opinion on Standardizing the Development of Supply Chain Finance to Support the Stable Circulation and Optimization Upgrade of the Supply Chain Industry Chain jointly issued by eight departments points out that supply chain finance should adhere to improving the operational efficiency of the supply chain industry chain, reducing enterprise costs, serving the complete and stable supply chain industry chain, supporting the optimization and upgrading of the industry chain, and national strategic layout.

Under this policy background, this project takes JD's first private enterprise warehousing logistics REIT under the heavy asset model as the entry point, combines relevant theories of

elastic supply chain, focuses on the forefront of the logistics industry, constructs a prediction model of elastic supply chain, deeply explores its supply chain elasticity, summarizes useful experience in effectively improving supply chain elasticity, and puts forward targeted suggestions to promote the healthy and vigorous development of China's logistics industry. The supply chain resilience in this project refers to the ability of e-commerce enterprises to withstand external shocks and recover from them in the event of unexpected events. The heavy asset model refers to a business model of tangible assets held by enterprises. After product updates, the production line needs to be updated, and the asset depreciation rate is high. Its biggest advantage is that the enterprise's assets represent a commitment and guarantee to customers, which is more conducive to building customer confidence.

## **2. Research on JD Logistics Heavy Asset Model**

### **2.1. Overview of JD's heavy asset model**

#### **2.1.1. Characteristics of heavy asset operation model**

Heavy assets refer to the total tangible assets owned by an enterprise, mainly fixed assets, including factory buildings, office buildings, machinery and equipment, a large amount of inventory goods and materials for production. Due to its high capital investment, high technological support, high asset depreciation rate, and low capital return rate, it occupies the circulating capital of the enterprise and may limit its business expansion and further development, so it is called heavy assets. Heavy asset industries include but are not limited to steel, coal, oil, transportation, real estate, non-ferrous metals, and machinery and equipment industries. Essentially, it is an operational model that solidifies controllable resources to prevent enterprises from leveraging more external capital to obtain greater economic benefits. The characteristic of asset heavy enterprises is that the proportion of fixed assets is relatively high, with fixed assets generally exceeding 20%. These enterprises often invest a large amount of funds in factories, equipment, raw materials, and other aspects. Having its own logistics and over 800 warehouses, JD fully conforms to the characteristics of heavy asset operation mode.

#### **2.1.2. JD's Development History after Choosing the Heavy Asset Model**

Different logistics models play different roles in the elasticity of the supply chain, affecting the magnitude of the elasticity coefficient of the supply chain. Due to the use of central warehousing, fees are charged for operations such as inbound and outbound operations, as well as storage days. After choosing to develop their own logistics on major e-commerce platforms, they mostly choose to build their own warehouses for cost saving reasons. JD is no exception. Unlike Alibaba's Taobao and Tmall, which both choose to cooperate with other logistics companies, JD has injected strong capital and incorporated logistics from platforms such as Eason into its own brand, attempting to establish a big logistics strategy under the JD brand.

JD Group belongs to the B2C model, which connects suppliers and consumers on the one hand, and sells its own products on the other hand. This model has led to a large investment in heavy assets and formed a heavy asset operation model. Since its establishment, JD Group's operation model has gone through the following three stages: ① from 2003 to 2006, it was in the initial stage and did not form a heavy asset operation model; ② From 2007 to 2013, a certain scale was formed, and large-scale investment in heavy assets began in 2009; ③ Since 2014, the logistics system has begun to take shape, and heavy assetization has gradually eased.

In the past, we have found through investigation that the empty load rate of some express delivery vehicles is quite high. When going to the station, they can load goods, and when returning, they mostly load turnover boxes and pick up items. If relying on central warehousing, it will undoubtedly greatly increase costs. Therefore, whether it is better to self operate or outsource, to change in real-time according to needs, or to gradually become self operated,

JD.com has given a perfect answer sheet: in the initial stage, by integrating outsourcing resources, Treating outsourced resources as one's own assets and managing outsourcing in a way that meets JD's customer experience needs. By conducting KPI assessments to manage third parties, on one hand, it can avoid excessive heavy asset pressure, and on the other hand, it can maintain the flexibility of JD's operations. When the time is right, by incorporating excellent outsourcing enterprises into its logistics strategy, it can establish well-known logistics routes.

## 2.2. Development advantages of JD's heavy asset model

JD has its own warehouse and can store goods in the nearest warehouse to customers based on big data in advance. As long as the customer clicks to purchase, they can usually receive the goods the next day, which is much more efficient than Taobao logistics. Therefore, customers often choose JD.com when they urgently need certain products. The representative of its preferred automation technology is undoubtedly JD's "unmanned warehouse": JD Logistics' Asia No.1 warehouse. The warehousing system has basically achieved unmanned operation, and from conventional ground work to three-dimensional warehousing, robots have been authorized to replace them. Especially in sorting, it has been fully automated, and the savings in labor costs have greatly reduced JD's financial losses. In the entire process of JD's unmanned warehouse, various robots with different functions and characteristics are applied, from goods to people, to palletizing, packaging, sorting, and then to packaging and transportation. These robots can not only process orders according to system instructions, but also complete tasks such as automatic avoidance and path optimization.

By building a self built intelligent warehouse, JD can reduce the transportation costs between warehouses, thereby reducing the costs of building a warehousing style and lowering logistics costs. The costs originally spent on logistics will be shared with the delivery personnel at the end of the delivery line to ensure high-quality delivery services. The delivery fee on Taobao, which goes through layers of transfers and ultimately reaches the hands of delivery personnel, is relatively low. In addition, the delivery process calculates bonuses on a per piece basis, resulting in significantly lower service compared to JD.

After three years of the epidemic, the advantages of online shopping have been fully utilized. Both Alibaba and JD.com have been linked to China's consumption. In 2021, the total transaction volume of online shopping reached 13 trillion yuan, with a total retail transaction volume of 44 trillion yuan, accounting for nearly 30%. Considering the smooth flow of goods in the future, the proportion of online shopping may further enhance JD.com's heavy asset operation model and increase logistics investment, It is also the most advantageous place in the future, which can significantly improve customer satisfaction. Thanks to this development and operation model, JD's total market value increased by 2.959 billion US dollars (approximately 21.4 billion yuan) to 44.998 billion US dollars overnight on November 15th. We achieved a sales revenue of 30 million in 2005 and 2.3 trillion in 2022.

## 2.3. Disadvantages of JD's heavy asset model development

Firstly, logistics companies under the heavy asset model will occupy a large amount of capital, resulting in significant loss of opportunity costs. The initial capital investment in JD's heavy asset model operation is large, but the profit margin is relatively low, and some assets, once put into use, will also generate huge opportunity costs, which will have a negative impact on the development of the enterprise.

Secondly, due to the strong professionalism of the assets invested in the operation of JD Heavy Asset Management, which is not universally applicable in logistics management, the liquidity risk of some assets is relatively high, which may be one of the hidden dangers in corporate financing risk.

Then, due to the high demand for cash in the early stages of JD's heavy asset operation model, which requires continuous expansion of scale, it is easy to cause cash flow tension in the early stages of investment. At this time, if JD Group encounters economic difficulties in operation, it is likely to lead to the rupture of the capital chain.

Finally, with a significant initial investment from JD Group, there was no significant profit return and the profit margin was relatively low. And the subsequent investment will be significant, constantly generating new updates and maintenance costs. In addition, under the influence of the "bottleneck effect", if JD Group wants to further obtain larger scale returns, it must correspondingly increase a large amount of capital investment.

### **3. The Impact of Heavy Asset Model on JD's Supply Chain Elasticity**

#### **3.1. Overview of Supply Chain Elasticity**

With the development of logistics information technology today, the supply chain system exhibits fragility against the dual background of network complexity and unknown external environment. Supply chain resilience refers to the ability to maintain continuous supply and quickly recover to normal supply status in the event of partial failure of the supply chain. When the supply chain is interrupted due to uncontrollable factors, if weak links of the supply chain are not maintained in a timely manner, it will pose a threat and damage to the overall process of the supply chain. Supply chain elasticity first emerged in the field of mechanics research and belongs to the field of physics. In 1973, Holling first introduced the concept of elasticity into ecology, defined as the ability of a system to absorb disturbances before equilibrium changes. Subsequently, the concept of elasticity was gradually introduced into different disciplines to describe the key characteristics of complex dynamic systems. Li Zhenping (2021) constructed a model using Gurobi and compared the data, proposing an elastic supply chain design problem based on various recovery strategies to improve its resilience in responding to the market.

#### **3.2. Calculation of the Impact of Heavy Asset Model on JD's Supply Chain Elasticity**

This article takes remaining resources, strategic inventory, financial capacity, risk management, buffering capacity, and user base as dimensions of supply chain resilience. Firstly, the nodes in the supply chain that are prone to breakage are considered, and supply chain resilience is divided into three dimensions: supplier resilience, internal resilience, and customer resilience for measurement. Finally, the variables for predicting supply chain resilience are determined.

Suppliers play a fundamental role in the logistics supply chain, and selecting suitable and high-quality suppliers is a problem that enterprise decision-makers must face. It is an individual or legal entity that provides products or services to retailers, other enterprises, units or individuals, and is an important guarantee for the operation of enterprise logistics. Manufacturers are specifically responsible for the production, implementation, and assembly of products, as well as enterprises engaged in product research and development, production, or manufacturing, including various companies engaged in mining, extraction, processing, planting, and assembly of products. The customer is the terminal of the logistics supply chain, and customer satisfaction greatly affects the reputation of the enterprise.

By constructing a simulation model for measuring supply chain elasticity, this study investigates the impact of JD's heavy asset model on JD's supply chain elasticity. Empirical results are analyzed from the perspective of supply chain interruption. The time interval from  $t_0$  before supply chain interruption to  $T$  after supply chain performance returns to its original level is evenly divided into  $X$  time nodes. Improvement methods are proposed for the original supply chain theory: Let  $t_0$  be the point in time before the supply chain is interrupted due to a sudden interruption at a certain node;  $T$ : At a certain point in time after the supply chain

performance has returned to its original level;  $X$ : The number of time nodes within the time period  $[t_0, T]$ ;  $t_i, t_j$ : the  $i$ -th and  $j$ -th time nodes in the  $[t_0, T]$  time period;  $x_i$ : Customer satisfaction of the supply chain at the  $i$ -th time node; The elasticity of the supply chain during the time period of  $[t_i, t_j]$  is  $R(t_i \rightarrow t_j)$ :

(1)

## 4. Measures to Enhance Supply Chain Resilience

### 4.1. Consolidate the infrastructure construction of the heavy asset model

The huge investment in the heavy asset model enables enterprises to gain scale advantages and easily form monopolies in the industry, and the large amount of capital investment in the heavy asset operation model helps to achieve agglomeration effects; Secondly, under the heavy asset operation model, enterprises invest heavily in fixed assets, including infrastructure construction such as factories, equipment, and production lines. These types of assets generate a significant amount of depreciation, which increases the operating cash flow adjusted by net profit in the company's cash flow statement, thereby easing the company's cash flow. This type of infrastructure provides more employment opportunities for the local area and drives local economic development. To some extent, it alleviates the situation of supply chain elastic fracture when uncontrollable factors occur.

### 4.2. Relying on big data analysis capabilities

With the advancement of digitalization, the advantages of big data are becoming increasingly apparent, and its application in the logistics field is also becoming more and more widespread. Although big data itself does not have heterogeneous characteristics, the ability to collect, analyze, and apply big data can improve the supply chain decision-making of logistics enterprises and create differentiated competitive advantages. Under the analysis of big data, logistics enterprises can leverage the unique insights of a large amount of data and reconfigure resources based on the observed market development trends in the real environment. The analytical ability of big data is the ability of logistics enterprises to use big data for auxiliary decision-making, which has its unique value in improving supply chain resilience. In the face of uncertain reality and fierce market competition, logistics enterprises should take corresponding measures to improve their management level and risk response ability, and minimize the adverse effects of natural disasters, social crises, and other factors on the supply chain of logistics enterprises.

## 5. Conclusion

Supply chain elasticity plays an irreplaceable role in the development of logistics enterprises. Based on the multidimensional measurement of supply chain elasticity, this article establishes a supply chain elasticity prediction model, and takes JD Group as an example to explore the impact of the heavy asset model on supply chain elasticity, expand the perspective of mechanics theory, and propose targeted suggestions for the development of e-commerce enterprises in China, thereby promoting the vigorous development of e-commerce logistics enterprises in China.

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