

Research on Supply Chain Optimization Path of Logistics Enterprises in the Era of Big Data

Yixuan Gao, Jicheng Liu

North China Electric Power University, Beijing, China.

Abstract

Big data is the product of the development of the digital information age. With the development of information technology, it has become an irresistible trend for enterprises to carry out supply chain management of big data. This paper analyzes the supply chain operation business and operation mode of domestic logistics enterprises, and finds out the actual problems of data-oriented management, such as insufficient data, data supply chain congestion, and data management disorder. In view of these three aspects of the problem to speed up the market expansion, improve the data scale, get through the supply chain of all links of the data, standardize the complaint data management and other suitable for the logistics enterprise data management innovation path, for China's logistics enterprises supply chain data development to provide a feasible reference basis.

Keywords

Big Data; Logistics Enterprises; Supply Chain; Optimal Path.

1. Introduction

With the progress of the times and the development of science and technology, digital information is omnipresent, the emergence and development of the era of big data has been unstoppable, and the company's supply chain management coordinated big data operation has become the general trend. According to IDC, the global total data volume reached 4.4ZB in 2013 and will reach 40ZB by 2020. The Outline of Action for Promoting the Development of Big Data issued by the State Council in 2015 emphasizes the importance of big data in the digital information age, and clearly points out that it is necessary to accelerate the development and application of big data and make systematic arrangements for the development plans of big data in a timely manner[1]. In essence, big data is the product of adapting to the development of the times and the analysis of modern massive digital information, which needs the support of constantly developing technologies. It is of great significance to the supply chain management operation of modern enterprises, and it also puts forward higher requirements to the industrial structure and operation management of modern enterprises. This paper takes logistics enterprises as an example and takes big data as the center to analyze the business model and operation status of supply chain management. At the same time, it also analyzes and studies the problems existing in supply chain management of enterprises under the background of big data and the optimization scheme.

2. Big data analysis in supply chain management of logistics enterprises

2.1 Logistics enterprise supply chain business analysis

The main business of traditional logistics enterprises is the transaction and transportation of large and bulk commodities. Compared with the small and medium-sized business of express enterprises, the business of logistics enterprises is relatively clear. In China, logistics enterprises mainly focus on

long-distance transportation of trunk lines, and make profits by transportation quantity and transportation weight. At the same time, with the increasingly fierce competition in the market, some of the idle capacity of logistics enterprises also provide short-distance and small parcel transportation. In the supply chain of upstream enterprises, upstream transition enterprises, intermediate enterprises, downstream transition enterprises and terminal enterprises, logistics and express delivery have their own emphasis. The transportation business of upstream and terminal enterprises is the main business object of express enterprises. The transportation business of upstream transition enterprises, intermediate enterprises and downstream transition enterprises is the main business of logistics enterprises.

2.2 Logistics enterprise operation business process analysis

Large items whose volume or weight is beyond the daily range of express enterprises to undertake (generally 20kg or 3m² and above), logistics enterprises will send business personnel docking corresponding customer orders. When large quantities of bulk physical goods need to undertake transport services, logistics enterprises actively provide the corresponding vehicle fleet to undertake business. Logistics enterprises are more onerous in their business, enterprise vehicles are mostly heavy and medium-sized trucks, so in the trunk line business is more active, frequent among the intercity highway, the city and the suburbs, but it rarely goes into the city to pick up goods. At the practical business level, logistics enterprises use heavy trucks for long-distance transportation, generally over 300km, which is called long-distance transportation capacity scheduling, while short-distance transport capacity dispatching uses medium truck transport, the distance is generally less than 300km. Domestic logistics enterprises have internal transportation network, mainly by the store sales department, express centers or express teams, distribution centers form the main back and forth business transportation lines[2], as shown in Figure 1.

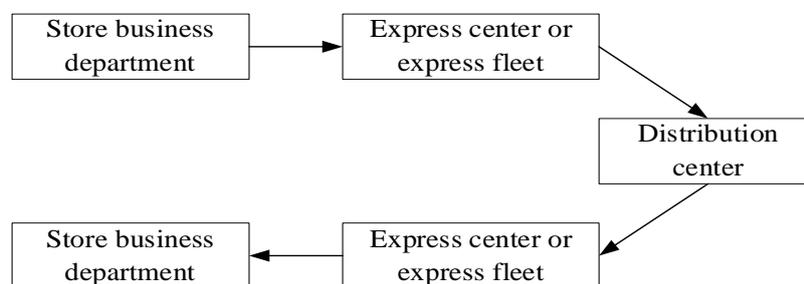


Fig. 1 Transportation lines of domestic logistics enterprises

3. Analysis of supply chain operation status of logistics enterprises

3.1 Organizational structure of logistics enterprises

Domestic larger less-than-carload logistics enterprises have shareholders' meeting, president's office, and three modules of function, operation and operating under the jurisdiction. The functional departments have jurisdiction over personnel, finance and IT. The operation departments have jurisdiction over dedicated lines, fleets and outfields. The operating departments have jurisdiction over business department and delivery department[3], specific as shown in Figure 2.

3.2 The business process of logistics enterprises

The business scope of logistics enterprises will expand to many aspects with the development of enterprises, but the core business is still logistics business. The basic business process is divided into the following steps. The goods are collected by the courier or the goods of the cooperative enterprises in the supply chain will be sent to the nearest business department. After packaging, the sales department will be transported to the nearest outfield in each region by its own fleet or external fleet. Distribution centers handle cargo classification. The caravan of each route carries the goods to the

corresponding outfield. The distribution center is then distributed to the nearest business department by the motorcade. The electric vehicle completes the terminal delivery of the final business department. In this business chain, many value-added services are derived, such as IT technology business, unmanned vehicle distribution business, self-pickup of goods, quality assurance of goods, financial planning, e-commerce sales, etc[4]. (See Figure 3).

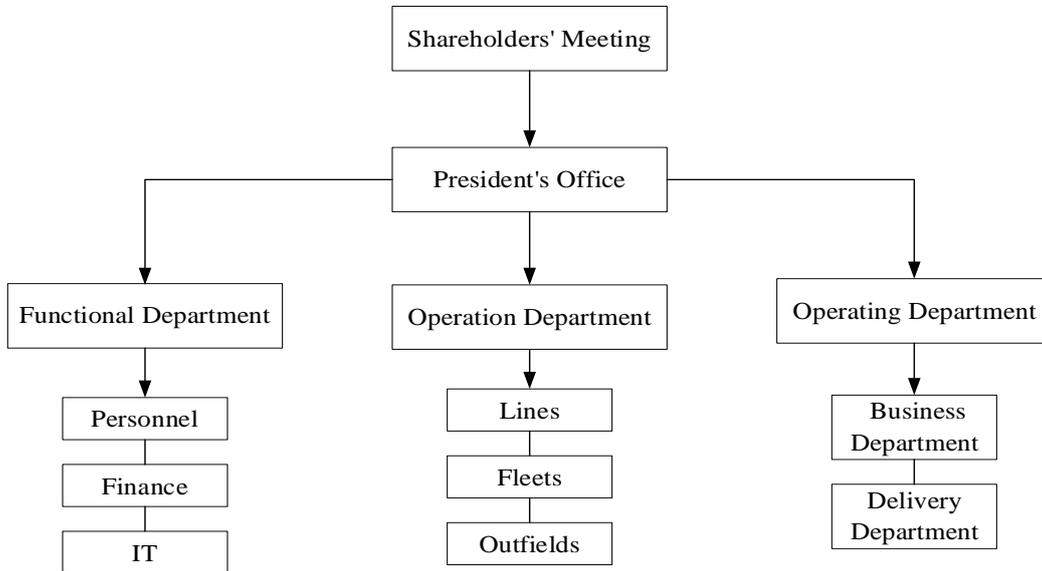


Fig. 2 Organizational Structure Chart of Logistics Enterprise

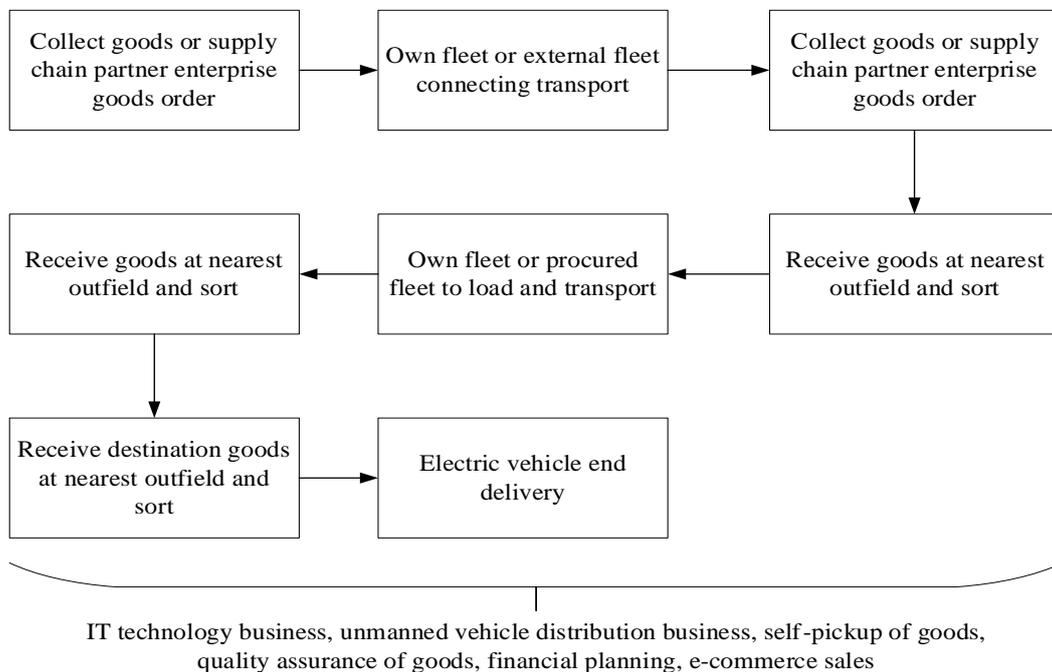


Fig. 3 Business flow chart of logistics enterprises

3.3 Supply chain data operation of logistics enterprises

The operation of the domestic logistics enterprises basically is given priority to with transaction process and data storage, while the actual statistical data technology still stays involved in business statistics and accounting audit. The data generated by the logistics supply chain includes basic information such as vehicle type, vehicle scheduling, fleet name, distribution center ownership

(regional acceptance), vehicle ownership and so on. These daily data generated by logistics business are systematically recorded and summarized by front-line staff, then downloaded from the Intranet by the business department that needs the data in the headquarters the next morning (working day), filter the data and sort out the data required by the corresponding business departments. Most of the software and technology in the process is at the technical level of Excel sheets. The data reports and reports processed by the data can be directly used as the performance indicators of each business department on the previous day in logistics enterprises and included in the KPI assessment of the department. As for the correlation between data, the mining and analysis of data is basically not involved. Decision-making is based on the amount of data presented on the surface and the degree of increase or decrease, which is used in a preliminary and superficial way.

3.4 Supply chain data processing process of logistics enterprises

The staff of the front-line stores will input the data of the previous working day into the internal system of the enterprise, then the IT department will capture and package all the data of the previous working day. The data demand department sends people to the IT department to collect the original data packet, and then goes back to the department to decompress and encrypt IT with the enterprise's own software. The data processing personnel of the department import the Excel program, and carry out batch screening, deletion or business modification of the data with basic operations. Relevant demand companies perform Excel basic processing on the data processed by this department[5]. The flow chart is shown in Figure 4.

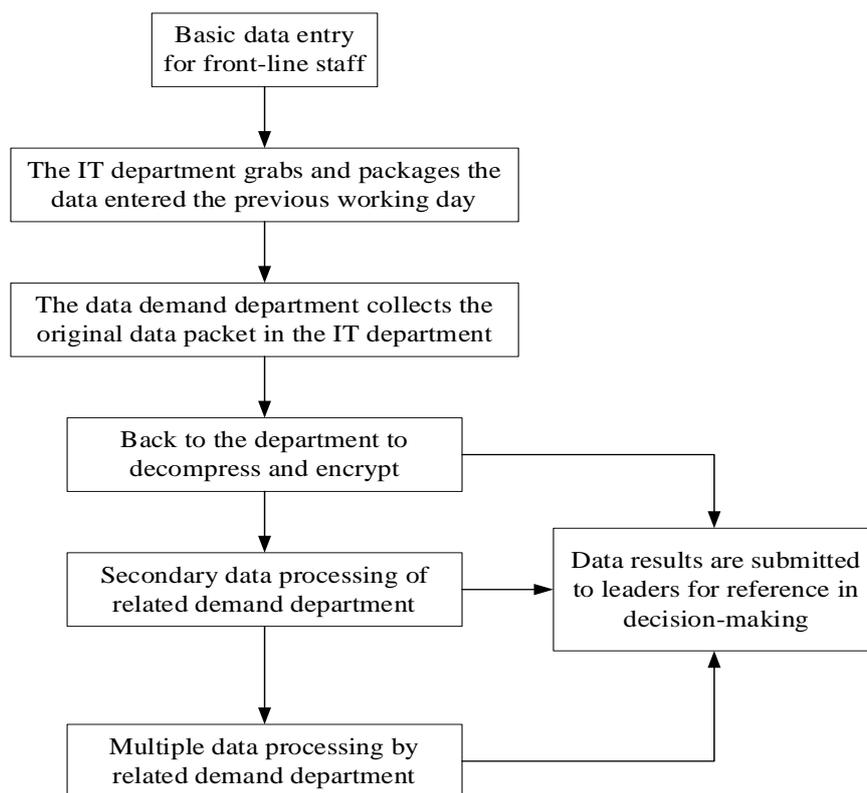


Fig. 4 Supply chain data processing flow of logistics enterprises

4. The main problems of logistics enterprise supply chain

4.1 Insufficient supply chain data

From the actual situation of data analysis of logistics enterprises, the data volume level of domestic enterprises is obviously insufficient. At present, the data volume generated by the representative domestic logistics enterprises in a single day stays is tens of thousands to hundreds of thousands of

pieces. Although the accumulated data volume meets the requirements of massive data, the actual data analysis of enterprises at the present stage is still conducted around the single day data. From the summary of domestic logistics data, the production volume of front-line business data of logistics enterprises is lower. Most of the actual business is still in the experience stage, and the actual business data generated is still difficult to meet the requirements of data collection and mining.

4.2 Data supply chain congestion

In the supply chain of logistics enterprises, there is little information exchange between the upstream enterprises, the upstream transition enterprises, the downstream transition enterprises and the terminal enterprises. Timely matching of data cannot be achieved, which leads to uncertainty of internal data processing personnel when processing data. Even if it can be confirmed, it will take more manpower and time to communicate. For example, whenever the data processing personnel in the logistics headquarters encounter the data base scale summarized by the vehicle types and vehicle uses in each major region, once the null value and error value of the data are found, they must rely on the telephone to determine with the field or outreach partners one by one, and then manually fill in the information. Sometimes, due to the limitation of the educational level and the cooperative consciousness, the drivers on site or the staff of the department may not be able to give a clear answer. Therefore, it takes time to contact the relevant grass-roots manager to solve the data missing or wrong value. In terms of internal core data, departments or enterprises in the data supply chain generally take a more defensive attitude and are more sensitive to the opening and sharing of data[6]. Therefore, data in the supply chain forms a "data island".

4.3 Complaint about poor data management

Customer complaint is the main source of after-sales service data of logistics enterprises. The statistics of complaint data has not been formally incorporated into the data statistics system in logistics enterprises at present. First of all, the customer service department and related personnel of the enterprise just want to solve the customer complaint simply, without in-depth analysis and summary of the complaint data, nor deeper excavation of the complaint reason. The customer service personnel will reply to the complaints and close the data after completing the actual requirements of the customers, so that the customer's complaint data can not be retained. Secondly, there is no effective reward and punishment supervision system, resulting in the internal part of the customer service staff processing complaints data is very arbitrary, and the phenomenon of private adjustment with complaints often occurs. The result is that the legitimate rights and interests of customers are often violated or the unreasonable demands of some customers are encouraged. Finally, the statistics of complaint data have not yet reached the structural level.

5. Logistics enterprise supply chain optimization path under the background of big data

5.1 Accelerate market expansion and improve data scale

The amount of data is generated from the accumulation of daily business and cannot be created out of nothing. Therefore, logistics enterprises can only accumulate the actual amount of data through daily business activities. First of all, accelerating the development of enterprises and expanding market share are the direct conditions for the generation of enterprise data[7]. Secondly, the data collection channels are guaranteed to reduce the loss of data transmission, and the enterprise data can be directly fed into the enterprise system after being generated. Finally, The personnel of data receipt, data entry and data operation shall be retrained to ensure that the probability of misoperation of data in the intermediate link shall be reduced.

5.2 Get through the data link of the supply chain

First of all, for enterprises in the logistics supply chain, more shared data should be provided, the concept of shared data should be improved, the awareness of accurate collection of front-line data entry personnel of enterprises should be enhanced, and the system should be strictly checked.

Secondly, on the premise of protecting the core confidential data of the enterprise, it can properly disclose the industry data report and the non-sensitive data of its own enterprise, so as to enable enterprises or departments in the supply chain to obtain relevant business data as much as possible. Thirdly, enterprises in the supply chain can form a "data strategic alliance" to form the necessary organizational and institutional guarantee, promote the enterprises in the supply chain to reach a new situation of data sharing, and ensure the effective use of data[8]. Finally, improve the function of the internal online system of the enterprise, improve the software function of data transmission on the supply chain, reduce the data blocking caused by the instability and imperfection of the system software, and upgrade the data system when necessary to ensure the update and iteration of the data.

5.3 Standardize complaint data management

Government regulatory departments need to launch the corresponding policies and regulations, industry institutions should also establish a more perfect complaint data management mechanism, to guarantee the authenticity of the complaint data and conduct scientific and reasonable statistical processing on the complaint data. Practitioners who falsify and maliciously manipulate complaint data will be punished more severely. Reward the behavior of actively ensuring the authenticity of complaint data and customers' real complaints and safeguarding their rights.

6. Conclusion

The advancement of digitization in logistics enterprises is the result of the all-round evolution and development of enterprise supply chain. In view of the problems existing in the digitization development of logistics supply chain in China, such as insufficient data, data supply chain congestion, data management disorder and so on, it is necessary to standardize and upgrade from multiple aspects. This paper discusses the innovation and optimization path from policy rules, industry supervision, enterprise market scale development, enterprise data technology upgrading, increasing the training and introduction of data talents, and building a perfect data system. Through the application and promotion of this path, it is expected to better help domestic logistics enterprises keep up with the development process of data-oriented, improve the data-oriented management level of logistics supply chain enterprises, share the dividends of data-oriented development, and contribute the strength in the field of logistics circulation to the construction of a manufacturing power and the acceleration of the development of advanced manufacturing.

References

- [1] Wang, B. H. China's photovoltaic industry development roadmap (2019 Edition) [R]. Beijing: China Photovoltaic Industry Association, 2020, (02), 3-39.
- [2] Gong, J. J., Ning, Y. C., & Zhang, G. P. Operation mode and optimization path of supply chain management of logistics enterprises in the era of big data [J]. Business Economics, 2019, (05), 80-84.
- [3] Mao, Y. F. Supply chain management of logistics enterprises in the era of big data [J]. Journal of Enterprise Economics, 2019, (10), 80-84.
- [4] Wu, X. X. Research on Supply Chain Demand Management Based on Big Data Theory [D]. Beijing: Beijing University of Civil Engineering and Architecture, 2017.
- [5] Yu, J., & Zhang, B. L. Analysis of Supply Chain Management in Circulation Industry Based on the Perspective of Big Data [J]. Journal of Business Economics, 2018, (07), 23-25.
- [6] Liu, Y. Supply chain demand forecasting and bullwhip effect under the background of big data [D]. Shenyang: Shenyang Aerospace University, 2018.
- [7] Wang, Z. P., & Feng, Y. W., Zhu, C. L. Research on Digital Resource Integration in Big Data Era: Model Design and Experimental Analysis with Logistics Industry as an Example [J]. Modern Intelligence, 2019, 39(9), 92-100.
- [8] Wang, H.T., & Yang, X. L. Research on the innovation and optimization path of logistics supply chain digitization based on the operation mode of domestic SL logistics enterprises [J]. Jiangsu Business Theory, 2021, (04), 31-34+66.