



# Application of Big Data Intelligent Management Technology in the Construction and Innovation of Free Trade Zone

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**Abstract.** In order to promote the construction of free trade zone and the innovation of system and mechanism, this paper puts forward the application research of big data intelligent management technology in the construction and innovation of free trade zone. By analyzing the implementation methods and steps of big data technology in the logistics management of Free Trade Zone A, this paper puts forward some ways to improve the logistics management system of Free Trade Zone, including building a big data logistics platform, improving operational capacity and forming agglomeration advantages. It is hoped that it can provide some basis for the mechanism innovation and economic and social development of FTZ, enhance China's ability of social, economic and environmental sustainable development, and realize the urgent need of sound and rapid economic development, and help FTZ embark on a brand-new development path. Taking the construction of free trade zone as an opportunity to promote the innovation of system and mechanism will be based on the transformation of government functions, so that the intelligent equipment manufacturing industry and the producer service industry will continue to integrate and create a new supply of government investment and management models.

**Keywords:** big data · Logistics management · Free trade zone · Construction and innovation

## 1 Introduction

In the overall plan of free trade zone construction, the effective transformation of government functions has become the primary task. Among them, perfecting the information network platform, establishing the enterprise credit information collection and sharing mechanism, and realizing cross-departmental collaborative management have put forward requirements for the government informatization construction of the free trade zone [1]. In the planning of Eastnet Technology, the future FTZ can rely on the North-east Regional Supercomputer Center, and incorporate enterprises and related data such as e-commerce, logistics and third-party payment into it through its powerful big data processing capabilities, forming a unified platform and entrance, and promoting the data

and process integration of marine express, cross-border e-commerce, high-tech, inspection and maintenance, financial leasing and other businesses [2, 3]. Data integration, data driving and data governance with big data as the core will accelerate the pace of free trade zone construction and innovation, and contribute to the coordination and improvement of market supervision, economic development, social management and public services, reform and legal system, environmental protection and urban construction. As the largest cloud computing and big data enterprise in Northeast China, Eastnet Technology will seize the opportunity of Shenyang's comprehensive deepening development, start with IT industry and big data new economic industry, closely combine the advantages of enterprises with the needs of social development, and contribute to the construction of free trade zone [4]. Figure 1 shows the big data management technology. The new round of reform and opening up has provided a good opportunity for the high-quality development of China's economy. A member of the Standing Committee of the Political Bureau of the Central Committee of the Communist Party of China and Vice Premier of the State Council presided over a symposium on implementing the "Opinions on Deepening the Reform of the Statistical Management System and Improving the Authenticity of Statistical Data". The Party Central Committee and the State Council attach great importance to statistical work. Premier Li Keqiang demands that we adhere to seeking truth from facts, ensure the authenticity and reliability of statistical data, and provide scientific support for various national decision-making arrangements. All regions and relevant departments should effectively enhance the "Four Consciousnesses", adhere to the overall tone of seeking progress while maintaining stability, vigorously promote reform and innovation, accelerate the construction of a statistical management system and mechanism that is compatible with the modernization requirements of the national governance system and governance capacity, focus on enhancing the scientificity and authority of statistical work, and strive to improve the authenticity and accuracy of statistical data. By establishing a new round of free trade zone system, China's institutional opening-up strategy will be better implemented, and it will be used as a starting point to promote the high-quality development of China's economy. Free Trade Zone can provide global service resources such as "global positioning" and "global service" for enterprises, which is helpful to enhance the global resource allocation ability and international operation ability of China enterprises and help them participate in global competition more actively [5].

## **2 Development Status of Logistics Management in Free Trade Zone a**

In 2014–2017, the volume of cross-border e-commerce import and export transactions in Free Trade Zone A showed a spurt growth year after year, reaching 1.38 billion yuan in 2015 and exceeding 2 billion yuan in 2016. However, there are still some factors that restrict the rapid development of FTZ, such as the degree of informatization of infrastructure and logistics professionals in FTZ management system [6].

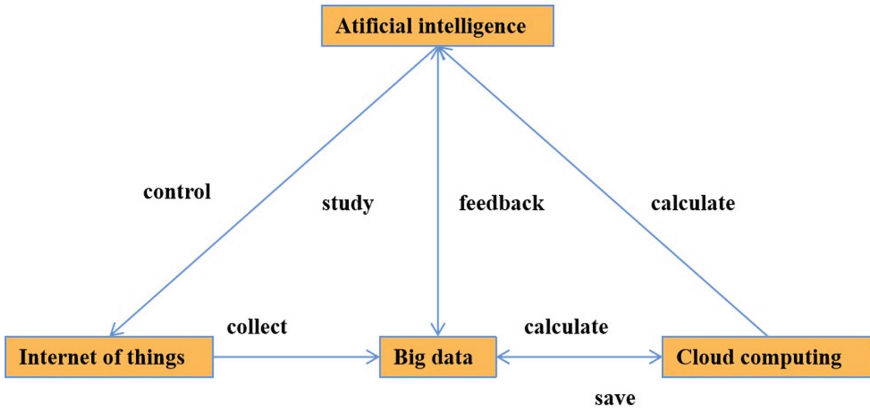


Fig. 1. Big data management technology

## 2.1 Insufficient Infrastructure Configuration

Judging from the logistics facilities and transportation facilities in Free Trade Zone A, there is a shortage of docks, yards, warehouses, loading and unloading transportation equipment, and international shipping functional areas are mostly equipped with conventional equipment, lacking automatic and semi-automatic equipment, which cannot meet the diversified storage, loading and unloading, distribution and other needs of products. The water transport channel is more mature, while the air transport channel and land transport channel are lagging behind, and the scale effect of multimodal transport has not yet formed [7].

## 2.2 The Degree of Informatization Does not Match the Demand

Take cross-border e-commerce logistics in Free Trade Zone A as an example. At present, traditional export logistics mostly relies on international express delivery such as UPS, FedEx and DHL, as well as China Post EMS, Amazon overseas warehouse and international logistics special line; Due to the restrictions of policies and regulatory requirements, import logistics mostly relies on bonded warehouses in the free trade zone, with bonded warehouses as the main logistics mode and experience stores as the supplement. The existing logistics information is still in a state of high consumption, low efficiency and extensive fragmentation. Logistics information system fails to give full play to the advantages of combining sales information and logistics information in two directions, and cannot provide auxiliary decision-making for the adjustment of proportion structure of inventory products and the choice of marketing strategy. In addition, the information system can't provide the tracking of product status information in the whole process, and the real-time sharing of order information between different enterprises and clients can't be realized [8].

### 2.3 The Micro-Foundation Needed for the Construction of FTZ a is Relatively Weak

(1) The scale of foreign trade in FTZ A is small, and the export competitiveness of processing trade needs to be strengthened.

From 2019 to 2022, the total volume of import and export trade has always ranked ninth in the country. In recent years, the processing trade of Free Trade Zone A has developed rapidly, and the processing trade volume has been increasing, but its overall scale is still small. Taking the statistical data of 2019 as an example, the scale of foreign trade imports ranked ninth in China, accounting for 25% of China's total foreign trade imports in the same period, and the proportion was basically the same as that of the previous year. In the same period, the scale of foreign trade exports ranked eighth in China, accounting for 2.8% of China's total foreign trade exports in the same period. The export of processing trade was US\$ 23.17 billion, accounting for 2.67% of China's processing trade (Table 1).

(2) Foreign-invested enterprises are still the main body of A's foreign trade export.

In 2019, foreign-invested enterprises exported US\$ 23.5 billion, a year-on-year increase of 1.2%, accounting for 40.5% of the total export value in the same period;

**Table 1.** Comparison of import and export of major trade modes between China and China in 2019a (unit: USD billion, %).

|       | mode of trade                     | Import and export value | compare to the same period of the previous year | export value | Net ratio | Import value | compare to the same period of the previous year |
|-------|-----------------------------------|-------------------------|---|--------------|-----------|--------------|---|
| China | general trade                     | 20099.4                 | 4.51  | 9880.21      | 7.71      | 10218.21     | 1.41  |
|       | processing trade                  | 13440.5                 | 3.11  | 8627.81      | 3.31      | 4811.71      | 2.41  |
|       | Special customs supervision area  | 4125.9                  | 29.81   | 1373.01      | 47.71     | 2751.91      | 22.21   |
| A     | general trade                     | 557.0                   | 18.11   | 295.61       | 32.71     | 260.41       | 4.81  |
|       | processing trade                  | 3594                    | -6  | 231.71       | -40.1     | 127.61       | 9.71  |
|       | Customs tezhu supervision qucheng | 96.2                    | 12.31   | 32.41        | -72.1     | 62.81        | 25.71   |

**Table 2.** Import and Export of Major Trade Modes in 2019

| mode of trade    | Export value<br>(USD 100<br>million) | Export growth<br>rate (%) | Import value<br>(USD 100<br>million) | Import growth<br>rate (%) |
|------------------|--------------------------------------|---------------------------|--------------------------------------|---------------------------|
| general trade    | 295.61                               | 32.71                     | 260.41                               | 4.81                      |
| processing trade | 230.71                               | -4.01                     | 127.61                               | -9.71                     |

Private enterprises exported US\$ 20.7 billion, up 65.8% year-on-year, accounting for 35.7%; State-owned enterprises exported US\$ 12.74 billion, down 11.5% year-on-year, accounting for 22%. Due to the unpredictable international market environment, it is much more difficult to control than the domestic market. With the support of the global strategy of the parent company, foreign-invested enterprises have firmly grasped the R&D and marketing links and seized the opportunities in the international market. The development goal of state-owned enterprises should be rooted in the domestic market, focusing on solving the problems of the national economy and people's livelihood and solving problems that the market can't solve. In the process of developing foreign trade, private enterprises are known for their flexible operation mode and strong mobility, and should become the main force of foreign trade. However, due to the shortage of funds, financing difficulties and talents, the potential of these private enterprises to explore the international market has not been fully released [9].

(3) The added value of processing trade is not high.

An important index to evaluate the added value of processing trade is the value-added rate of processing trade, which is equal to (processing trade export-processing trade import)/processing trade import. According to the statistics in Table 2, it is calculated that the value-added rate of A processing trade in 2019 is 80%, which is slightly higher than the national average (79%). Compared with developed coastal areas, there is still a big gap. This shows that A's processing trade is not high in technology, and mainly focuses on labor-intensive and low value-added products, and A's processing trade is still at the low end of the international industrial value chain.

### 3 Big Data Technology in the Free Trade Zone a Logistics Management Implementation Steps

Big data technology includes data structure analysis of data storage warehouse, data security protection, data mining technology, etc. It is a large-scale, multi-category and rapid dissemination of various data technologies based on the Internet. The development of big data is a complex systematic project. First, we must determine the source of logistics big data, then collect and analyze the corresponding big data according to the preset scenarios, and then select special tools to process, preprocess, classify and mine the big data, and finally output the required analysis results to assist decision-making in related fields.

### 3.1 Free Trade Zone a Logistics Big Data Demand Analysis

The primary goal of the free trade zone is to improve customer service satisfaction. To achieve this goal, the following measures can be taken: by utilizing customer historical transaction data and demand forecasting data, advance procurement and storage of different types of goods in transit warehouses in various regions. In this way, when an order is received, it can be shipped quickly, shorten the delivery time, improve the quality of the shipment, and improve delivery accuracy and convenience. In the processing trade transformation and upgrading service area, the production data of benchmark enterprises can be compared and TQM (Total Quality Management) strategy can be introduced. Continuously improve production processes by optimizing design processes, simplifying production, distribution, and distribution processes. By comparing and analyzing the evaluation index data before and after improvement, it is determined whether to reduce the cost per unit product and improve product quality to meet customer expectations. Build platforms for technology research and development, industrial design, testing and certification, e-commerce, data services, and collect characteristic data of best-selling products from different countries and regions. This can provide information support for products entering the international market. Establish an emergency warning mechanism to reduce demand fluctuations caused by uncertain factors by monitoring changes in key logistics link data. To achieve the optimal goal of the overall logistics process. Considering the different functions undertaken by free trade zones in finance, trade, overseas investment, etc., there is a wide variety of relevant data. In order to effectively process these data, suitable data processing technologies can be selected, such as relational database management systems (RDBMS) and distributed computing frameworks (such as MapReduce). This allows for targeted analysis and specialized processing of data to support the operation and decision-making of free trade zones [10].

## 4 Conclusion

Big data technology plays an important role in the field of logistics. It includes the analysis of data structure in data storage warehouses, data security protection, data mining techniques, and the use of the Internet for rapid dissemination and analysis of large-scale, multi category data. The development and application of Big data technology is a complex system engineering. First, it needs to determine the source of logistics Big data, and then collect and analyze data according to preset scenarios. Next, use special tools to process, preprocess, Statistical classification, data mining and other processing of Big data, and finally output the required analysis results to support decision-making in related fields. The free trade zone has superior geographical advantages and plays an important role in promoting the the Belt and Road policy. In order to meet this development demand, logistics practitioners in the Free Trade Zone must combine advanced Big data information technology, make full use of market space and business opportunities, improve the level of enterprise logistics management, and accelerate the process of digitalization and internationalization of logistics business. At the same time, free trade zones should promote cooperation and division of labor among different functional layers, organically integrate their own development strategies with national

strategies, and overall enhance logistics competitiveness and sustainable development capabilities.

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