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**WORLD MARITIME UNIVERSITY
SHANGHAI MARITIME UNIVERSITY**

Malmö, Sweden



**RESEARCH ON THE LOGISTICS
DEVELOPMENT MODEL OF SHANGHAI FREE
TRADE ZONE**

by

XIE YUHONG

A dissertation submitted to the World Maritime University in partial
Fulfilment of the requirements for the award of the degree of

**MASTER OF SCIENCE
In
MARITIME AFFAIRS**

(INTERNATIONAL TRANSPORT AND LOGISTICS)

2020

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature):

(Date):

Supervised by:

Supervisor's affiliation:

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First of all, I would like to express my heartfelt thanks to Professor Liu Wei for his careful guidance on this research. Professor Liu's painstaking efforts have been embodied in the whole process of my dissertation, from topic selection, system design, to the final draft of the dissertation. During the dissertation completion, Professor Liu Wei's patient guidance and constant encouragement helped me a lot. Professor Liu Wei has been deeply impressed by his rigorous style of study, broad academic vision and tireless teaching.

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Finally, I would like to thank my classmates who have been accompanying me all the time. Without their care and help, I wouldn't have today's achievement. Thank you for your support!

ABSTRACT

Title of Dissertation: **Research on the Logistics Development Model of
Shanghai Free Trade Zone**

Degree: **MSc**

With the continuous development of the world economy, economic globalization has become an irresistible trend. In this context, the China (Shanghai) Pilot Free Trade Zone, the first free trade zone in China, came into being. Shanghai free trade zone has taken the first innovative step in docking international rules, government management methods, law making and operation mode, thus becoming a pioneer in deepening reform in China.

In this sense, the development path of Shanghai free trade zone is still at a groping stage. This dissertation studies the logistics development model of Shanghai FTZ, focuses on the logistics field, and explores the development path of Shanghai FTZ, so as to find a universal and reproducible logistics reform method applicable to the whole country and promote the development of logistics industry.

This dissertation starts with the general theory of modern logistics and draws lessons from the theoretical and practical results of free trade zone in both China and the world. Combined with the actual situation of the Shanghai free trade zone, this dissertation analyzes the status quo and development goals of free trade zone logistics, proposes alternative scheme for logistics development model, constructs a multi-objective decision-making model, and makes decisions on alternative plans to obtain the results of preferential development mode. It verifies the practicability of grey system in the logistics development of free trade zone and puts forward some suggestions for the logistics industry construction of Shanghai Free trade Zone.

KEYWORDS: Shanghai free trade zone, Logistics optimization scheme construction, SWOT analysis, Grey theory, MADM model

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LIST OF ABBREVIATIONS

FTZ	Free Trade Zone
MADM	Multiple Attribute Decision making
ILIMS	Integrated Logistics Information Management System
FDI	Foreign Direct Investment
TTIP	Transatlantic Trade and Investment Partnership
BRICS	Brazil Russia India China and South Africa
OFDI	Outward Foreign Direct Investment

1 Introduction

1.1 Research background

After more than 50 years of development, the early free port has gradually evolved into a high-level FTZ. As a platform for global economic development, the FTZ has been developed in many countries in the world. From the perspective of a country, they can effectively promote the economic development and attract more foreign funds. At the international level, they can effectively promote the progress of international trade. Therefore, FTZs are highly valued in developing countries and emerging countries and have been vigorously developed in these regions. The development of the FTZ can be attributed to the innovation in the management mode. First of all, the free trade zone is much open and free in policies, bringing preferential treatment and convenience to enterprises. In terms of geographical location, FTZs are often established in areas where international trade is flourishing and have strong regional advantages. Therefore, FTZs are bound to attract more enterprises to settle in, distribute and transfer more international trade goods.

The development of Shanghai FTZ was seen as the beginning of setting up a FTZ in China, which was officially founded in 2013. Logistics industry are also closely linked and mutually reinforcing with Shanghai FTZ. On the one hand, Shanghai FTZ has a superior geographical location and preferential policies, which will lead to the rapid growth of the trade volume in the region and its surrounding areas, provide sufficient business volume for the logistics industry and create significant

development opportunities. On the other hand, the relevant policies issued by Shanghai government for the FTZ's development will play a positive role in promoting the logistics operation process and provide a strong impetus for the rapid development of the logistics industry. In addition, the Yangtze river delta is committed to the development of production and manufacturing industry in a marvelous scale these years. It has become the region with the strongest comprehensive capacity in China and the most intensive implementation of the national reform strategy. This region relies on logistics, especially the logistics of Shanghai FTZ, to push its products to foreign countries.

The study on the logistics model of Shanghai FTZ can ensure the efficient operation of the FTZ and promote the economic development of China. From the macro point of view, the logistics system of Shanghai FTZ belongs to the category of social and economic subsystem, and its efficient operation can greatly stimulate the overall social economic benefits. From the micro point of view, the efficient operation providing high quality and low price logistics services to customers, thus helping related enterprises in the FTZ to enhance their market competitiveness.

1.2 Research purpose

At present, the research on the logistics development mode of Shanghai FTZ is still in the groping stage, and the research achievements on the development mode of FTZ logistics are not very rich. With the continuous development of economic globalization, the importance of the construction of FTZs to the economic development of a country will become more and more obvious. The study of FTZs will become a hot issue in the future.

Based on the current international situation, many developed countries, led by

the United States, have established a number of cooperative partnerships to improve their international trade status. For example, TTIP has formed new global trade and service industry rules by gathering strong forces of all parties. Therefore, China can also gather multiple resources for the platform of Shanghai FTZ to enhance China's international status. The healthy development of logistics system in Shanghai FTZ not only promotes the effective connection of various subjects and functions of the FTZ, but also improves the overall quality of logistics in Shanghai FTZ through rational allocation of various resources and realizes the development mode of low input and high efficiency. In addition, the advanced and efficient logistics system can provide guarantee for attracting investment in Shanghai FTZ, allowing more excellent domestic and foreign enterprises to enter Shanghai FTZ, providing rich resources for Shanghai FTZ in the fierce market competition, promoting Shanghai FTZ to occupy a place in the international trade market, and providing a strong guarantee for China to stand firm in the new international trade system.

In recent years, Shanghai has been fully implementing the "four centers" strategy, that is, to build Shanghai into an international economic center, an international trade center, an international financial center and an international shipping center. The logistics system of Shanghai FTZ can guarantee the steady development of Shanghai FTZ and thus provide a strong impetus for the construction of "four centers".

1.3 Literature review

More and more multinational enterprises take the FTZ as the logistics center to explore the Latin American region when they are planning the regional logistics system (Thurston, 1996). The regional logistics system planning is divided into two types: one

is for the traditional transportation planning network planning, the other is for the consumption and production distribution and transport as the main function, for the center location, scale planning and node planning (Olive, 2002). Research in Atlantic city shows that strengthening the capital and technology input on logistics node, urban transportation, highway, etc, will be conducive to the conclusion of the whole development of regional logistics (Perry and Trunick, 2003). Ackermann and Muller (2005) put forward the solution to the market changes in logistics resources waste and insufficient problem, they say, the effective integration of transport planning platform, logistics infrastructure and logistics demand process is conducive to the formation of regional logistics system.

The government also plays a decisive role in the development of regional logistics. Panos Kouvelis and Meir J. Rosenbatt (2005) introduced factors such as capital subsidies, tariffs, trade rules and taxes into the constructed mixed integer programming model in their research on global facility network. The results show that factors such as capital subsidies, tariffs, trade rules and taxes play a key role in the construction of global production and distribution network.

Logistics information technology can drive the development of regional logistics. integrated logistics information management system (ILIMS) can integrate all the information involved in the global logistics and transportation process, and be used to satisfy the information exchange between customers and merchants in different regions, with low operating cost. Empirical evidence proves that ILIMS can effectively improve the performance of customers and logistics service providers (Choy *et al*, 2006).

In addition, research results show that the third party logistics supplier can get development with the development of free trade area and at the same time a large number of international logistics enterprises in the free trade area construction multiple warehouses, to provide customers with high-quality low-cost logistics service

(Cornelia Steiner, 2003). By analyzing the logistics industry in the United States about its effect on the establishment of free trade area and promote, could find that the high-end import distribution center will set up their own distribution outlets in FTZ to provide quality logistics services (Curtis, 2005). Moreover, the establishment of FTZ can bring benefits to land distribution centers, aviation logistics enterprises, ocean logistics enterprises and multi-modal transport enterprises, thus bringing more benefits to customers (Curtis, 2004).

In terms of regional logistics research, Ping (2003) analyzed the essential elements of a complete logistics system. He thinks that a complete logistics system needs a suitable geographical location, a comprehensive transportation network with complete functions and flexible storage and transportation facilities in hardware, and a developed logistics information system, a perfect logistics service management system and a high quality logistics service quality in software. The necessary elements of the logistics development model research system of Shanghai FTZ logistics industry are also divided into two aspects: hardware and software. In terms of hardware, the regional logistics system should be equipped with logistics enterprises, logistics transfer system and infrastructure. In terms of software, it should include logistics policy, logistics information platform and logistics mode (Sun *et al*, 2005). Zhao (2009) further discussed the planning of regional logistics system. In terms of hardware, the planning of regional logistics system includes logistics infrastructure and related enterprises, which cover the scope of shippers, information, logistics and infrastructure. In terms of software, the cooperative operation mechanism of the main body of each unit, relevant logistics industry policy and logistics information platform. Cheng (2005) analyzed urban logistics planning, and he believed that urban logistics planning not only needs to plan the hardware such as logistics infrastructure, but also needs to plan the urban logistics distribution system and the software of urban logistics information platform. For example, regional logistics resources should be coordinated

and integrated from space and time, so as to systematically build a regional comprehensive logistics system, and clarify the status, nature, function, structure and development objectives of the logistics system (Jiang *et al*, 2008). Dai (2013) defined the regional logistics system structure, and he believed that the main body of the structure should be logistics enterprises. The environment should include the macro market and the regional market, and the platform should include logistics infrastructure, logistics information and logistics industry policy. The management mechanism should consider the node system of the logistics network and the government and the logistics industry association.

With the continuous development of China's FTZ construction in recent years, more and more domestic scholars have conducted in-depth studies on the subject of FTZ logistics. Feng (2014) studied the impact of the establishment of Shanghai FTZ on China's logistics industry by integrating the policy scheme, trade terms and regional advantages of the FTZ. Based on the establishment of Shanghai FTZ, Wang (2015) combined the influence of the FTZ on the remanufacturing industry caused by customs performance, import tariff, timeliness of freight and other factors. In order to study the recycling decision of enterprises and the layout of logistics network, he built a model, which took network operating income and logistics performance index as the targets and calculated the recovery rate of enterprises on products through the form of dynamic pricing. Wang (2015) under the background of the New York FTZ policy, conducted an in-depth analysis of the operation process of the automobile logistics service model, and further proposed relevant Suggestions on how to improve the development of automobile logistics enterprises in the Shanghai FTZ. Guo(2015) proposed that the development of international port logistics in Jiangsu, Zhejiang and other provinces around Shanghai was influenced by the establishment of Shanghai FTZ, and carried out PEST analysis on the development status of Jiangsu port logistics industry under the background of the linkage effect of FTZ,

and further proposed the coordinated development strategy of Jiangsu port logistics industry. Since the Shanghai FTZ will be a highly open economic and trade zone in the future, and full integration with the international market is the most important function of the FTZ, market interest rate should be implemented in the Shanghai FTZ.

1.4 Dissertation Structure

The first part is the introduction. This dissertation mainly introduces the research background and significance. At the same time, the dissertation expounds and summarizes the theoretical achievements in the field of regional logistics system construction, and then puts forward the necessity of studying the logistics development mode of Shanghai Free trade zone in this dissertation.

The second part expounds the research method of this dissertation. On the basis of the grey system, the grey target decision model is used to solve the multi-objective decision problem, and the establishment of the multi-objective decision model is described in detail.

The third part is the analysis of the current situation of logistics development in Shanghai FTZ. Through the analysis of the objectives, characteristics and framework of logistics system, the advantages and problems to be solved in the development of logistics industry in Shanghai FTZ can be more clearly understood, which lays a theoretical foundation for the follow-up research.

The fourth part is the establishment of the development mode decision-making model for the logistics development of Shanghai free trade zone. This part is the actual situation and real data of logistics construction as the basis for the model construction. Objective and prudent decision analysis is made on the

logistics development mode of Shanghai FTZ, and the result of priority development mode is obtained.

The fifth part is the implementation strategy of logistics development of Shanghai free trade zone. Based on the calculation results of the decision-making model in the fourth chapter, this part puts forward specific and feasible measures for the development of logistics industry.

2 Research methodology

First of all, this dissertation uses SWOT analysis method. After years of innovation and development, SWOT analysis is not limited to the planning and development of a single enterprise, but is widely used to evaluate the vitality and development prospects of things, becoming a major analysis theory of current market analysis and strategy.

The grey target decision-making method is also used in this dissertation. This method is very suitable for constructing the priority development mode decision model of logistics development in Shanghai FTZ. Moreover, the comprehensive decision-making method based on gray model is more scientific than other decision-making methods, especially for multi-objective and multi-decision schemes.

2.1 SWOT analysis

Based on the SWOT analysis method, four sets of strategy by pairing internal and external environments can be got, which is SO strategy, WO strategy, ST strategy and WT strategy. SO strategy is to use internal advantage to get external opportunities, make enterprises get rapid development. WO strategy is through the enterprise external opportunities to modify internal weaknesses, make enterprise comprehensive strength increased. ST strategy is reasonable, taking advantage of the enterprise to avoid or reduce loss brought by the external environment threat. WT strategy is through the strengthened enterprise internal weakness to avoid or deal with the

external environment.

SWOT analysis is one of the main analytical theories of market analysis and strategy. As a method to study and solve practical problems, SWOT analysis has been widely used in many industries and regions. Therefore, it can be effectively applied to the analysis of practical logistics problems and the search for solutions. Through the analysis, this dissertation can have a clear understanding of the future development of logistics industry in Shanghai FTZ, which is of great significance to the promotion of China's FTZ.

2.2 MADM model

There are a lot of multi-attribute decision making problems in social and economic activities. Therefore, in the past 30 years, many scholars have studied and discussed the problem of MADM (Multiple Attribute Decision making) in multiple directions and obtained rapid development. Grey target decision making is one of the methods to solve the problem of multi- attribute Decision making in grey system theory. In the grey target decision research, the index decision value is obtained by calculating the deviation degree between the effect value of each index under consideration and the worst effect value of the index. Finally, the decision value of each index is weighted to obtain the final decision value. The grey target decision models treat the importance of each index equally and model the effect sample matrix of each index. Therefore, in multi-attribute decision making, each index should be placed in the same dimension as far as possible, or the value of the indicator should be de-dimensioned.

Methodology

Let the multi-attribute decision problem have n evaluated objects or proposed

decision plans to constitute the decision plan set S , $S = \{S_1, S_2, \dots, S_n\}$. m evaluation index or attributes constitute index set A , $A = \{A_1, A_2, \dots, A_m\}$, then the effect sample matrix of scheme S index set A is:

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1m} \\ x_{21} & \cdots & \cdots & x_{2m} \\ \vdots & \cdots & \ddots & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{nm} \end{bmatrix} \quad (1)$$

In general, index set A , $A = \{A_1, A_2, \dots, A_m\}$ can be divided into three types, namely, "efficiency type", "cost type" and "interval type". "Efficiency type" index means that the larger the value, the better the index; "cost type" index means that the smaller the value, the better the index; "interval type" index means that the value falls within A specific interval $[A, B]$, which is the best index.

Make

$$z_j = \frac{1}{n} \sum_{i=1}^n x_{ij} \quad (j=1, 2, \dots, m) \quad (2)$$

If A_j is an effect-type index, then

$$r_{ij} = \frac{x_{ij} - z_j}{\max \left(\max_{1 \leq i \leq n} \{x_{ij}\} - z_j, z_j - \min_{1 \leq i \leq n} \{x_{ij}\} \right)} \quad (j=1, 2, \dots, m) \quad (3)$$

If A_j is a cost-type index, then

$$r_{ij} = \frac{z_j - x_{ij}}{\max \left(\max_{1 \leq i \leq n} \{x_{ij}\} - z_j, z_j - \min_{1 \leq i \leq n} \{x_{ij}\} \right)} \quad (j=1, 2, \dots, m) \quad (4)$$

Through the transformation of the effect sample matrix $X(t)=(x_{ij})$, the decision matrix R is obtained and the elements in R are dimensionless. For any $r_{ij} \in [-1, 1]$, $(i=1, 2, \dots, n; j=1, 2, \dots, m)$, r_i is the effect vector of scheme i .

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1m} \\ r_{21} & \cdots & \cdots & r_{2m} \\ \vdots & \cdots & \ddots & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{nm} \end{bmatrix} \quad (5)$$

Definition 1: If $r_j^0 = \max\{r_{ij} | 1 \leq i \leq n\}$, then $r = \{r_1^0, r_2^0, \dots, r_m^0\}$ is the optimal effect vector of multi-index grey target decision, which is also called bull's eye.

Assume that the weight vector w of each index is determined by Delphi survey method or AHP method, $w = (w_1, w_2, w_m)$, $w_j > 0$ ($j=1, 2, \dots, m$), $\sum_{j=1}^m w_j = 1$.

Definition 2: Let $r_i = (r_{i1}, r_{i2}, \dots, r_{im})$,

$$\varepsilon_i = |r_i - r| = \sqrt{w(r_{i1} - r_1^0)^2 + w(r_{i2} - r_2^0)^2, \dots, + w(r_{im} - r_m^0)^2} \quad (6)$$

is called the off-target distance of the effect vector r_i . The size of the off-target distance reflects the quality of the effect vector.

The smaller the off-target distance of effect vector r_i , the better the S_i of the decision scheme. Conversely, the greater the off-target distance of effect vector r_i , the worse the S_i of the decision scheme.

3 Analysis of the current situation of logistics development in Shanghai FTZ

In 2013, Shanghai FTZ was officially put into operation after being approved by the state council. This important measure is not only a national strategy, but also an experimental platform for China to open up to the outside world in terms of international trade and investment. Once put forward, this measure has attracted wide attention from the world. The Shanghai FTZ mainly carried out management reform in the four areas of investment, trade, finance and in-process and post-event supervision, and achieved fruitful results. However, it should be noted that the logistics operation of the Shanghai FTZ, its achievements and the experience and lessons learned in the past operation have not been systematically and comprehensively summarized and analyzed.

3.1 Overview of FTZ logistics development model

3.1.1 Status quo and characteristics of FTZ

The degree of global economic integration is getting deeper and deeper, and the cooperation between countries is getting closer and closer. In this context, the development features of the free trade zone are as follows:

On a global scale, the FTZ construction extremely quickly. Some of the free trade zone construction started earlier countries have won big profits from the free trade zone, improve its international status, also provides the construction of FTZ in

the early construction experience. At the same time, it also has a strong incentive effect on other countries that have not carried out FTZ construction.

FTZ's comprehensive function was improved. After decades of development, The functions of the FTZ now are all-inclusive, many of which have entered the mature development stage with rich experience in many aspects, the overall competitiveness has developed to attract many enterprises to settle. At the same time, the free trade zone after years of perfect management system, can guarantee on the healthy and stable development.

Infrastructure construction is gradually improved. The future development of the FTZ has been fully considered in the initial site selection stage. Trade zones often choose to be established in regions with good infrastructure to ensure their smooth operation and development and to lay a solid foundation for their future operation. It will increase its investment before and after its establishment to expand the economic carrier capacity of the region.

The supervision of the FTZ is more rigorous. The development of the FTZ needs to go through constant trial and error. The government needs to constantly revise and improve its policies, laws and systems to cope with the problems found in the operation, so as to ensure the development of the FTZ towards a favorable trend.

From abstract to concrete, Free trade zone could be divided into three levels of elements, functions and management.

Table 1 - Three levels of free trade zone

Level	Content	Example
Level of elements	The trade free	Reduce trade barriers, such as tariffs, quotas and restriction on the proportion of transnational sales
	The customs free	Cross customs regulatory
	Geographical advantage	Adjacent to ports or land ports of traffic, developed areas
Level Functions	General trade functions	Import and export trade, entrepot trade
	Processing trade function	Export processing zone
	Logistics distribution function	Bonded warehouse
	Other features	International finance, commodity exhibition, etc
Level of management	Different management systems formulated according to the characteristics of different regions	

3.1.2 Analysis on the development model of FTZ

The function of a FTZ is closely related to the policies, economy, society, transportation and many other factors of the country and the region. According to the different functions of the FTZ and the development degree of the country or region, the development mode of the FTZ will also be different, which can be roughly divided into the following four modes.

The model of free port dominated by entrepot trade

This development model is mainly suitable for countries or regions with superior geographical location advantages on the one hand and small market capacity disadvantages on the other hand, such as Singapore and Hong Kong. They are at the

heart of the world's major trade routes, but are limited by the size and population of their respective countries. In this case, the form of free trade, which is based on entrepot trade and focuses on the development of free ports, is more suitable for the development of such FTZs.

Trade distribution mode of bulk logistics

Such a development model has been adopted in the FTZs of port cities such as Rotterdam and Bremen. Although the geographical location of these regions is poor and they are not in the world's major trade routes, they have a huge trade market of the EU and play a key role in the EU's trade with other regions in the world. Therefore, these regions can realize the development of regional FTZs by distributing goods and distributing large quantities of goods.

The model of border free industrial zone based on export processing

For some inland areas, such as Mexico's northern border, no coastline, does not have the conditions of the open ports, but with the adjacent geographic advantages, the use of the advantages in Maquiladora established free border industrial zone, the industrial area is mainly for business to provide processing base in the United States, in order to attract large number of domestic and foreign enterprises, including the United States, Japan and European countries. About 80 percent of the products produced in the industrial zone are exported to the United States. For some industrialized countries and regions that have developed in modern times, the construction started relatively late, with no sound construction system and a small regional scope, such as China's Taiwan, Malaysia, Indonesia and the republic of Korea. Without strong economic regions and perfect port construction conditions, they seized the opportunity of global economic adjustment in the last century and devoted themselves to building a “FTZ” dominated by export business. Most of these “FTZs” also serve as export processing zones,

providing storage and transportation services for a small amount of international trade.

A resource-based import substitution free trade model

As a poor inland region of Brazil, Amazonia has no coastline and is not close to other countries. It has no superior geographical location, but it is rich in natural resources. Under these conditions, the Brazilian government established the Manaus free trade area in 1957. The FTZ covers a wide range of areas and has no connection with external regions. Its construction core cannot be based on import and export trade or processing and export. Instead, it mainly develops its own resources to replace the demand for imports in the region, which also achieves the goal of industrialization construction in the region.

To sum up, there are various forms of FTZs in the world and they are widely distributed. For areas with a small area but sufficient labor force, their FTZs are mostly dominated by export processing business. For the area with perfect port construction and superior traffic location, the business of entrepot port is the main business. For large countries with geographical advantages and rich resources, FTZs should be built in a variety of ways. Multi-functional FTZs should be built in well-developed regions, and featured FTZs can also be built in regions with special conditions. FTZs within a country may also function differently depending on their location, such as the Miami foreign trade zone and the New York foreign trade zone in the United States, where the former is mainly engaged in entrepot trade and additional services, while the latter is mainly engaged in import and import processing.

3.2 Overview of logistics system of Shanghai FTZ

The logistics system of Shanghai FTZ is based on the four special customs supervision

areas of Waigaoqiao bonded logistics zone, Waigaoqiao FTZ, Yangshan bonded port zone and Shanghai Pudong airport comprehensive FTZ, as well as the expanded Jinqiao development zone, Zhangjiang science and technology zone and Luzui financial zone, taking Waigaoqiao port, Yangshan port and Pudong airport three major hub port as the core and composed of materials needed for transportation, logistics infrastructure equipment, modern information technology, logistics service suppliers, logistics service objects and relevant government regulatory agencies such as port management, customs, maritime affairs, inspection and quarantine, frontier defense, etc. It is capable of providing transportation, warehousing, packaging, loading and unloading, circulation processing, distribution, information services, e-commerce, finance, customs clearance, agency, transit and other logistics services.



Figure 1- Range diagram of Shanghai FTZ

The economic effects brought by the construction of free trade zone in different aspects usually appear at different time points, and the different effects often have different characteristics. For example, trade effects and welfare effects are

characterized by static effects. After the signing and operation of the FTZ, the trade flow and structure among the member countries will change significantly, and the price of imported goods purchased by consumers may decline rapidly. The short-term static effect of FTZs refers to the “pure” effect that will soon appear due to the establishment of FTZs when other conditions remain unchanged. It is an economic change that can be easily observed in a short period of time after joining the FTZ. To increase trade and improve national welfare through signing free trade agreements is the initial motivation for the construction of various types of FTZs in reality. The short-term static effect comes from the improvement of circulation efficiency after market integration and is a special economic effect that cannot be replaced by other factors.

Considering different time points and different dimensions, the potential economic effect of the construction of Shanghai FTZ can be shown in Figure 2.

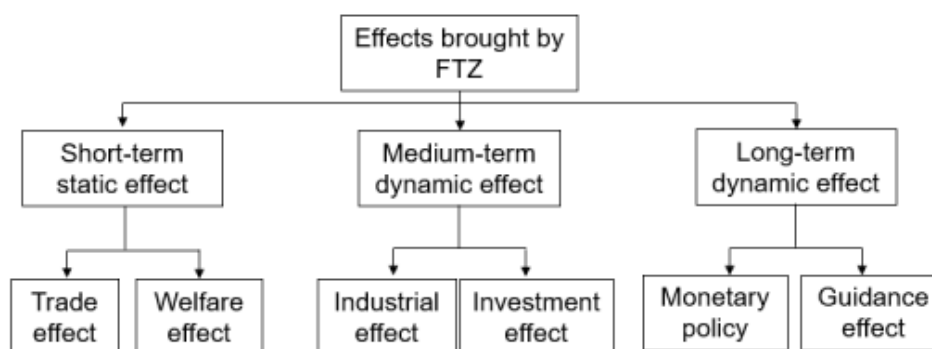


Figure 2 - Effects brought by FTZ

3.2.1 Logistics system objectives of Shanghai FTZ

The objectives of logistics system of Shanghai FTZ mainly include two aspects: first,

from the perspective of logistics demand, to improve the level of logistics service. Second, from the perspective of logistics service, to reduce logistics costs.

To create commodity space and time efficiency, improve logistics service

To meet the needs of customers is the most basic goal of logistics system in Shanghai FREE Trade Zone. According to the requirements of customers, appropriate products should be delivered to appropriate places in appropriate conditions, at appropriate costs and at appropriate time. On the basis of meeting the needs of customers, the normal pursuit is the improvement of logistics service level.

The construction of logistics system of Shanghai FTZ can effectively integrate logistics service demand, logistics supply capacity and logistics service function, and provide better logistics service for customers.

Through the continuous improvement of logistics infrastructure, each logistics node can be effectively connected to improve the logistics operation efficiency, so as to provide timely and rapid logistics services for customers. The convenience policies and logistics talents of Shanghai FREE Trade Zone are also conducive to improving the efficiency of logistics activities and perfecting logistics services.

To achieve effective connectivity of logistics links, reduce logistics costs

First, in order to realize the handover of goods, the demander of logistics service seeks for appropriate logistics service providers and spends huge transaction costs in negotiation, negotiation, contract signing, supervision and other activities. Among them, a large number of repeated negotiations lead to the waste of funds, and frequent speculative behaviors lead to after-treatment costs. Therefore, the construction of logistics system of free trade zone should aim at reducing logistics transaction cost.

Second, in the process of logistics activities, logistics information as an important factor to coordinate each logistics link, logistics information's not transparent, not smooth is one of the reasons to hinder the efficiency of logistics operation. The logistics system of Shanghai FTZ should pay attention to the construction of logistics information system, realize the sharing of logistics information, and reduce all kinds of costs in the process of collecting logistics information.

Thirdly, the logistics system of Shanghai FTZ should constantly improve its logistics infrastructure, ensure smooth logistics channels and reduce inefficient logistics activities. So as to realize the effective connection of each logistics node, reduce the unreasonable phenomenon in transportation, storage and other aspects, so as to reduce the transportation cost and storage cost.

Fourth, trade facilitation is the basic function of the Shanghai FTZ, which is derived from a series of institutional innovations in the Free trade Zone. Preferential policies on logistics can reduce logistics costs of logistics enterprises. Therefore, the logistics system of free trade zone should aim at the continuous improvement of logistics policies to reduce logistics customs clearance, tax and other costs.

3.2.2 Characteristics of logistics system of Shanghai FTZ

Circled by building a diversified Shanghai FTZ

The core of the logistics system of Shanghai FTZ is the Shanghai FTZ, which includes not only regional logistics business, but also urban logistics and even international logistics. The diversified logistics system of Shanghai FTZ is mainly reflected in the following aspects:

First of all, in terms of space scope, the FTZ covers enterprises in the zone,

enterprises outside the zone, and even domestic and foreign enterprises. Secondly, from the perspective of resource utilization scope, both domestic and international resources are utilized. Finally, from the perspective of time span, it takes a large time span for materials to arrive from the supply place to the demand place.

Guided by the introduction of dynamic policies on Shanghai FTZ

The logistics system of the Shanghai FTZ is not only influenced by the international trade environment and the global situation, but also guided by the policies of the Shanghai FTZ, such as the negative list and the regulation of entry and exit. In addition, the changing environment at home and abroad and the policy of FTZ make the demand, supply and channel of Shanghai FTZ logistics system dynamic.

Instructed by the completion of multiple participants with complexity

The logistics system of Shanghai FTZ involves multiple participants, mainly logistics service enterprises, logistics service enterprises and financial institutions, etc. In addition, it also includes logistics information technology and logistics infrastructure. In terms of logistics service demand of enterprises, the logistics services of enterprises are not the same. As far as logistics service enterprises are concerned, they are mainly port enterprises, transportation enterprises, customs clearance and other logistics enterprises. As far as government regulatory agencies are concerned, the agencies mainly include customs inspection and FTZ management agencies. From the perspective of financial institutions, credit insurance and other institutions can provide perfect financial services such as capital settlement for the logistics system of Shanghai FTZ.

Targeting in launch a comprehensive logistics service to improve the quality

As a logistics enterprise with multiple service types, the logistics system of Shanghai

FTZ can provide systematic logistics services for the demander of logistics services in the zone, including cross-border transportation, bonded storage, circulation processing, distribution services and customs clearance agents. In addition, logistics service also pursues the effective connection of each logistics link, the economization of logistics service, and guarantees the timeliness of goods delivery.

3.2.3 Logistics system framework of Shanghai FTZ

The logistics system of Shanghai FTZ is a complex system based on three logistics service platforms: logistics infrastructure system, logistics information system and logistics guarantee system, in which the main body of logistics supply provides comprehensive logistics services for the main body of logistics demand. Figure 3 is the schematic diagram of logistics system architecture of Shanghai FTZ.

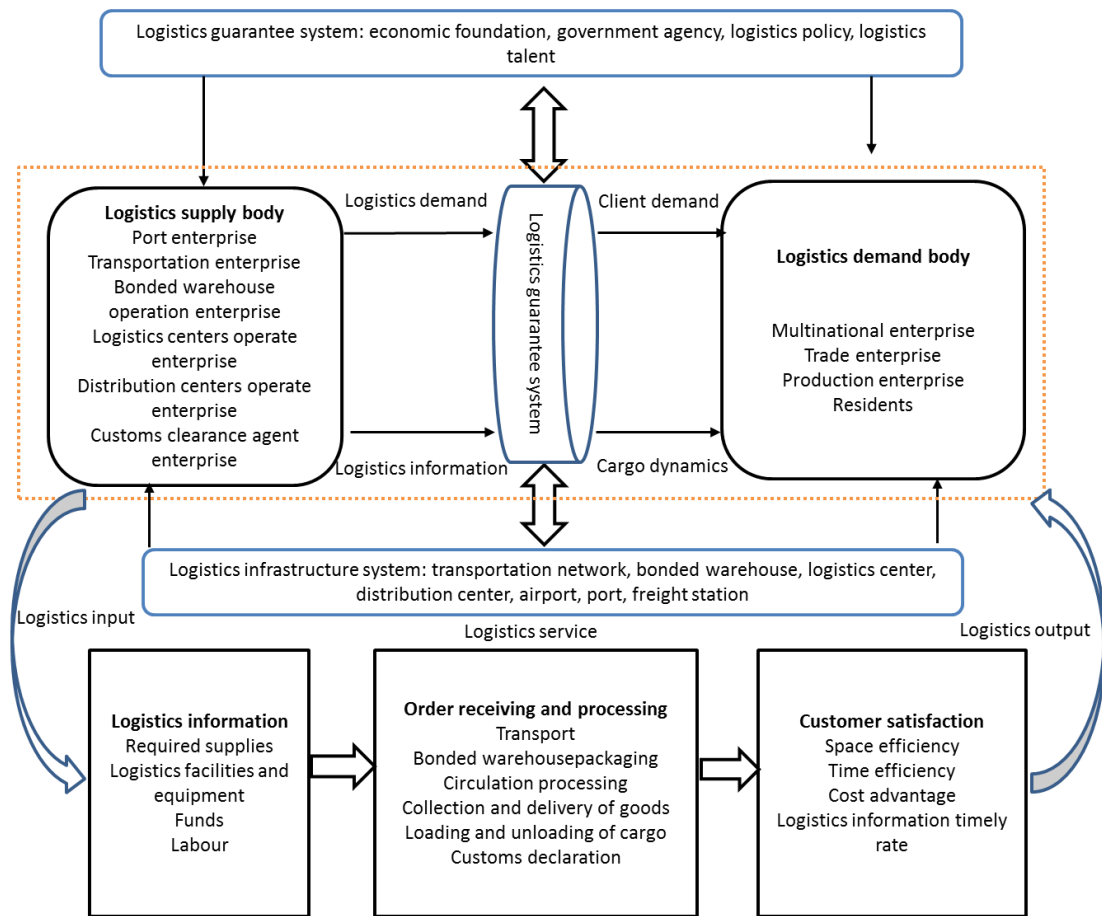


Figure 3 - Schematic diagram of Shanghai FTZ system framework

Logistics infrastructure system mainly refers to the transport network of relying on the Shanghai free trade zone logistics operations and logistics nodes, logistics information system can effectively connecting the main body, ensure logistics information fast, accurate delivery, logistics guarantee system mainly provide economic support for the Shanghai free trade zone logistics system, policy support and personnel security.

4 MADM model construction

In the process of model construction, multiple logistics development goals and alternatives of logistics development modes are needed. The former is the premise of the latter, and the two are closely related. Therefore, this dissertation firstly establishes the objective matrix through SWOT analysis method, formulates reasonable targets, and expand this as the alternative scheme of logistics development model. Then, the multi-objective grey target decision-making method is applied in constructing the priority, which is suitable for the model.

4.1 SWOT analysis of logistics development of Shanghai FTZ

4.1.1 Analysis of the advantages

Obvious geographical advantages

As the central city of the Yangtze river delta, Shanghai is located at the intersection of the coastal economic belt and the Yangtze river economic belt, occupying a superior geographical advantage. With the sustained and steady economic development, Shanghai has become the leading city in the economic development of the Yangtze river delta region. As an important trade port, Shanghai has provided strong support to the logistics in the surrounding areas. Shanghai has good natural resources and superior geographical location, both internally and externally, as well as along the river and the coast, so that it has a strong ability to influence economic development. In terms of land transportation, the Shanghai FTZ has the Beijing-Shanghai high-speed railway and the Shanghai-Shenzhen high-speed railway, two major arteries

with huge flows in both passenger transport and logistics, connecting the Bohai rim economic zone with the Yangtze river delta economic zone and the pearl river delta economic zone, supporting the north-south logistics exchanges and regional economic integration. In terms of water transport, Shanghai runs through the Yangtze river waterway in the east, central and west of China, with Shanghai port and major ports along the Yangtze river, forming the world's busiest international port city.

High participation of logistics enterprises

The implementation of the business registration system and the innovative negative list management model in the FTZ has enabled the FTZ to realize “freedom without prohibition”. Major logistics enterprises, including Jindong, SF Express, “Santong yida”(China's largest logistics enterprise alliance) have entered the Shanghai FTZ one after another. In addition, a number of new logistics enterprises have also been registered. They can develop freely in the Shanghai FTZ and obtain “institutional dividends”. A series of innovations in Shanghai FTZ have promoted the reverse mechanism of logistics enterprises, such as management innovation and system innovation, which not only helps logistics enterprises to have a more flexible development mode, but also promotes the internationalization process of enterprises, and at the same time can cultivate a group of excellent logistics talents. It is reported that among the enterprises in Shanghai FTZ, logistics enterprises have a high participation, accounting for about 30% of the total number of enterprises. For example, thousands of logistics enterprises gather in Yangshan bonded port zone alone, covering a wide range of business, including bulk commodity transportation and third-party processing and distribution. In the Shanghai FTZ, the logistics industry is characterized by low cost and fast efficiency. For example, the logistics and warehousing costs are reduced by 10% on average, and the customs clearance time is shortened by 3-4 days on average. On the other hand, Culigo, Good logistics treasure

and Hongdi logistics and other new enterprises have been growing.

Abundant logistics practitioners

Shanghai's GDP is growing steadily. By 2025, it is expected that Shanghai's GDP will more than double that of 2013, reaching 465.362 billion yuan, and it is expected to reach 6.5 trillion yuan by 2030. The development of logistics system of Shanghai FTZ will gain a good prospect from the stable growth of Shanghai's economic environment. On the one hand, the logistics industry investment of Shanghai FTZ will get strong financial support, on the other hand, the logistics demand level of Shanghai FTZ will also be driven. It is estimated that by 2030, the total number of employed people in Shanghai will reach 22.05 million, which is also a trend of steady growth. The logistics practitioners will also be improved due to the overall rise in the employment level, and the logistics system of the Shanghai FTZ has a strong talent support.

The supervision mode of “enter the zone first, then declare at the customs”

On the one hand, the supervision mode of “enter the zone first and then declare at the customs” reduces the logistics cost of enterprises, on the other hand, the customs clearance time is greatly shortened on the whole. In the process of customs entry and exit of logistics transport vehicles in the FTZ, automatic procedures can be used to complete the inspection of goods entering and leaving the customs at one time, including automatic identification of license plate and container number, verification and cancellation of vehicle UPS information, etc. In general, the supervision mode of “enter the zone first and declare at the customs later” can realize the simultaneous completion of customs declaration and delivery of goods into the zone, which greatly saves the cost of customs clearance and the logistics cost of enterprises.

4.1.2 Analysis of the disadvantages

In recent years, although the scale of logistics industry in Shanghai has been greatly developed, there are still some deficiencies on the whole, such as a lack of specialization and a gap in operation efficiency compared with developed countries. In addition, although Shanghai has made a lot of achievements in logistics infrastructure construction, it has not been able to keep up with the pace of developed countries in terms of management system.

Logistics enterprises lack competitiveness

Shanghai FTZ logistics enterprises lack international competitiveness and service trade is relatively backward, especially in the field of cross-border e-commerce. A large number of logistics services, especially international express business, mainly rely on foreign-funded enterprises. The weak link of Chinese enterprises still exists in overseas warehouse logistics and distribution services. At present, there is no logistics enterprise with relatively mature service model, service quality and service brand and competitive ability in the international scope. According to the statistics of the ministry of commerce, in 2013, the cross-border e-commerce of China's import and export trade exceeded 500 billion us dollars, and in 2015, it exceeded 1 trillion us dollars. In this context, the Shanghai FTZ urgently needs to pay more attention to the development of cross-border e-commerce logistics. As a platform for China's foreign trade, the FTZ will seriously affect the rapid development of China's import and export trade.

Insufficient trade environment

At present, attracted by the Shanghai FTZ, a large number of multinational companies have settled their headquarters here, and these enterprises have also put forward a

series of personalized requirements. Shanghai FTZ logistics enterprise for these requirements, however, can't do better tolerance, also cannot be pro-business, doing well, has not fully adapt to the market environment. The lack of overall analysis to the market and the lack of the differentiated services defects, lead to the cooperation with part of the multinational company can't effectively keep on for a long time. In this regard, the Shanghai FTZ needs to make corresponding adjustments to attract leading domestic and foreign logistics enterprises to settle down, so that the international voice of the Shanghai FTZ can be gradually strengthened.

Low informatization level of logistics management

In recent years, China's electronic technology has developed rapidly, but the information technology in the logistics industry is not enough to ensure the full automatic operation of the industry. The relevant government policies also did not vigorously promote the use of high-tech information technology in the logistics industry in a wide range, cannot be with the relevant units of the industry useful information perfect integration. At present, specifically speaking, Shanghai logistics management information technology has the following problems:

For logistics management information application technology development is less, logistics management information system construction process to promote slow, the lack of information sharing between enterprises, mutual exchange of data resources are rare.

Compared with the regions with developed logistics system, the development level of logistics management system in China is relatively low.

Backward logistics infrastructure

At present, the logistics foundation of the FTZ still has the following defects:

The transportation infrastructure with sound functions, wide coverage and high

development level is lacking, and the overall scale development is insufficient, especially in the road transportation network, and the construction of highways in some areas is insufficient.

Insufficient logistics transfer capacity, insufficient cargo storage capacity, and lack of efficient transit nodes. The information platform construction lags behind, the information exchange is slow, resulting in the overall operation efficiency is low. The goods distribution mechanism is not perfect, and the corresponding facilities in the process of distribution also need to be improved.

Backward goods storage infrastructure, lack of automation and information equipment and technology, resulting in low efficiency of warehousing in and out. Although China's logistics infrastructure has been developed to a certain extent, compared with developed countries, there are still many problems, such as low utilization rate of facilities and incomplete facilities.

The development and practical operation of logistics technology are still in the primary stage, and the construction level of information operation system with modern high and new technology is insufficient, lacking the technology and equipment development that you can play to meet the development requirements of modern logistics industry.

Lack of service quality and management level

The modern logistics industry is based on the quality of logistics service, so it is highly dependent on the modern logistics industry to improve the management system. Therefore, it can be seen that the lagging logistics service information network of the FTZ will bring non-standard service quality to the logistics industry. Although the overall development of Shanghai FTZ has promoted the further innovative development of modern logistics industry, there is still a certain distance to realize modern logistics, at least a lack of effective management standards. At present,

logistics enterprises over-rely on the economic benefits brought by goods transportation and storage services, ignore the added value of service quality brought by circulation processing and value-added services, and lack of professional level of systematic planning when planning the logistics system. International trade has gradually entered a stage of diversified development, and the management system of logistics industry should keep up with the requirements of The Times. In general, the logistics industry service quality after the follow-up is not sound enough development and lack of professional level, which leads to the logistics industry service quality still does not have the appropriate evaluation standard, which seriously hinders the development of the logistics industry.

Lack of logistics professionals

As a pilot FTZ in China, Shanghai has abundant talent and other resources. However, with the expansion of the construction scale of the FTZ, more and more enterprises will enter the Shanghai FTZ, which will bring more demand for logistics talents. China's 12 categories of talents in short supply include logistics professionals. According to the current university training plan, logistics talents will be in short supply for a long time. In 2016 alone, China's talent demand gap in logistics is close to 10,000. As shown in table 1, there are a total of 10.202 million employees engaged in logistics related industries in China, among whom 629,000 are in Shanghai, accounting for 6.2%. High-quality talents with bachelor's degree or above account for 16.3%. Among them, the number of graduate students is even less, with only 2.4% and 83.7% of them being college graduates or below. Different from other regional FTZs, Shanghai FTZ is positioned at the global level. Therefore, if Shanghai FTZ wants to develop modern logistics industry, it needs more high-level professional logistics talents. At present, logistics talents are not only in short supply, but also the knowledge reserves of existing talents can not meet the development needs of modern logistics

industry, which leads to the logistics industry in the FTZ does not meet the development needs. Therefore, the development of modern logistics industry in Shanghai FTZ needs to speed up, keep up with the development requirements of The Times, train logistics talents with the characteristics of Shanghai FTZ who have rich theoretical knowledge and practical experience in logistics and broad international vision, and put forward unique opinions for the new policies and development of the FTZ.

Table 2 - Distribution of logistics talents in domestic and Shanghai

	Master degree or above		Bachelor degree		College degree or below		Total(m)
	Pop.(m)	W(%)	Pop.(m)	W(%)	Pop.(m)	W(%)	
China	0.13	1.3	1.16	11.4	8.9	87.3	10.2
Shanghai	0.015	2.4	0.087	13.9	0.52	83.7	0.62

Resource: National Bureau of Statistics of the People's Republic of China

4.1.3 Analysis of the opportunities

Sound development momentum of the free trade zone

In the past few years, the Shanghai FTZ has achieved fruitful results and become a gathering place for manufacturing and import and export trade, thus making the logistics industry gather with the gathering of various market factors. So far, 51 financial reform measures have been introduced and implemented in Shanghai FTZ, and 2046 financial enterprises have been settled in the zone, with smooth capital flow. In addition, according to the statistics of 30 departments, the Shanghai FTZ has initially collected 3.64 million pieces of information about enterprises, Banks, industry and commerce, customs and other information data. These favorable information data

will play an important role in coordinating the relationship between the zone and the zone outside the Shanghai FTZ. They can integrate and coordinate all kinds of information, accelerate the construction of product supply chain and service supply chain in an all-round way, and promote the development of green supply.

Innovative development model of FTZ

Shanghai FTZ has a development model integrating production, trade, finance and logistics. It has a wealth of service innovation and institutional innovation, as well as relevant policies issued by China Banking Regulatory Commission, China Securities Regulatory Commission, China Insurance Regulatory Commission and other departments to promote the development of Shanghai FTZ. All have played a positive role in promoting the development of logistics enterprises in Shanghai FTZ. For example, in supply chain financial services, RMB cross-border two-way capital pool and so on. FTZ issued on the “financial support to China (Shanghai) opinions of the construction of the FTZ ”([2013] no. 244), “on the implementation of Shanghai payment institutions for cross-border RMB payment advice” ([2014] no. 20), “about in China (Shanghai) FTZ, let go of small foreign currency deposit interest rate cap notice ”([2014] no. 23), and other related policy. In addition, the implementation of trade facilitation and liberalization can also promote the transfer efficiency of logistics goods. At present, the processing trade enterprise income tax shall be reduced “to less than 15%”, “exempt from processing trade goods import tariff measures such as” has been officially implemented in Shanghai FTZ, it can also greatly speeded up the internal and external logistics circulation speed, so as to create more goods for Shanghai FTZ flow space, thereby to improve the transfer efficiency greatly.

National policy support

The development of logistics industry in Shanghai FTZ can benefit from relevant

national strategies. In terms of financing channels for enterprises, in the overall scheme of the FTZ, enterprises are encouraged to make full use of domestic and foreign resources and markets to realize the liberalization of cross-border financing. Such free policies provide a wide range of financing channels for logistics enterprises. Secondly, in order to ensure the full development of young enterprises at the initial stage, the corresponding tax policies launched by the Shanghai FTZ reduce the tax burden on these enterprises, thus attracting more investment for the FTZ. In addition, as a national strategy, the construction of the Shanghai FTZ aims to provide an open platform for free trade and investment, try to transform government functions, promote the transformation of trade patterns, and deepen the opening and innovation of the financial sector, so as to gain replicable construction experience for the implementation of FTZ nationwide in the future. On the other hand, as a platform for building Shanghai's international financial center and shipping center, the Shanghai FTZ is conducive to promoting the rapid development of regional economy, especially in Shanghai and the Yangtze river economic belt. In recent years, the Shanghai FTZ has made a lot of achievements, obtaining more than 20 system and management innovations that can be promoted, as well as innovative management methods such as negative list and power list, which also make the spatial boundary between the government and the market clearer.

Increasing demand of logistics enterprises

Thanks to the free trade environment and preferential policies, the trade volume in the Shanghai FTZ is bound to grow rapidly. Therefore, logistics facilities and the demand for high-quality services are bound to increase, especially for warehousing, transportation, supply chain and other services. The tariff policy of the FTZ will promote the gradual reduction or elimination of tariffs, so that more and more enterprises will enter the FTZ, and the number and types of goods transferred and

distributed in the FTZ will naturally increase accordingly. This has created a huge demand for goods temporary storage, transportation, distribution and other logistics business. These demands mainly include port, sea and land transportation, warehousing and other aspects, which undoubtedly create good opportunities for the major logistics service enterprises in the region. The expansion of logistics service demand market in the FTZ will not only create profits for logistics service enterprises, but also promote the transformation and upgrading of major logistics service enterprises in the zone. The single warehousing and transportation business has been unable to meet the diversified needs of logistics services, forcing the warehousing and transportation business to develop into diversified businesses, and at the same time deriving a variety of value-added services, such as bonded logistics and processing logistics.

4.1.4 Analysis of the challenges

A competitive environment

The logistics service enterprises in the FTZ are facing the competition from their domestic counterparts, from product quality and customer service ability to price and supply chain cooperation ability. Faced with such a highly competitive environment, the survival of logistics service enterprises in the FTZ depends on whether they can customize their own strategic goals to achieve transformation and upgrading. On the other hand, it is also a huge challenge for domestic logistics service enterprises to meet the high requirements of large manufacturing enterprises for logistics service, such as high efficiency, high accuracy and high service quality. The fierce market competition has gradually transformed logistics into a buyer's market. The traditional logistics service, which only provides goods transportation and storage services, can no longer meet the requirements of customers for logistics services and is no longer what the

market needs. Logistics enterprises must be deeply aware of the important role of modern integrated logistics services and personalized logistics services in improving the overall competitiveness of logistics enterprises.

Risks exist in the field of trade and investment

With the rapid development of China's economy in recent years, China has gradually increased its overseas investment. In order to cope with this trend and limit China's state investment, some countries have increased FDI protectionism, which makes Chinese enterprises need to take more risks when investing in these countries. In-depth analysis for several reasons, first, the domestic enterprises to understand the local law is not comprehensive and in-depth, as an economic risks and cultural differences, can't make the right treatment timely and accurate way. Second, the political situation is unstable countries for investment, these areas are not stable legal system guarantee for investors to provide a safe and reliable, thus increasing the investment risk. Third, investment in developed countries, some of the host country will discriminate against domestic investors, when obstacles caused by investment security review mechanism.

On the other hand, China has not yet a sound investment service system. Firstly, service agencies that promote outbound investment also have regulatory responsibilities, which prevent the introduction of a unified and coordinated management approach. Secondly, investment promotion service institutions are often unable to formulate a sound investment plan and strategic planning for overseas investment enterprises. At the same time, fees are still relatively high. In the investment insurance industry, there are also problems such as high insurance costs and complex claim settlement procedures.

In addition, although the Shanghai FTZ has put forward financial system innovation and foreign exchange management system reform to clear the obstacles of overseas financing and exchange, China has not carried out large-scale OFDI yet, and

domestic financing still accounts for a large proportion. The Chinese government is unable to achieve the real coordinated development in the financial support of overseas enterprises, and there are still some imbalance in the treatment of state-owned enterprises and private enterprises. The domestic financial market has not been fully developed, the bank approval process needs cumbersome procedures, high prices and low efficiency, domestic loan guarantee restrictions are numerous. The above problems have restricted the overseas investment of China's private enterprises. At present, Shanghai FTZ has not put forward effective solutions to these problems.

The legal environment is not sound enough

The Shanghai FTZ faces a huge legal challenge because it needs to go beyond the local government and the state council's administrative regulations, and to a large extent break through the scope of its legal powers. Only when a breakthrough is made in law can the FTZ play its full role. First, the lack of legislation. After the implementation of the admission national treatment system, both private enterprises and foreign-funded enterprises are included in the Shanghai FTZ, and the original company law does not apply to enterprises in this environment. Therefore, it is urgent to adapt the management regulations and laws of the FTZ. Second, resolve disputes. At present, the Shanghai FTZ has set up an agency to settle disputes within the zone in terms of its administrative duties. However, as a court within the zone, the agency does not have enough authority and has no clear jurisdiction. The goal of the legal construction of the Shanghai FTZ is to reasonably use the international dispute settlement mechanism to solve the disputes between investors and the government. Third, the question of legal coordination. Due to the particularity of the Shanghai FTZ, there are bound to be some differences between the policies inside and outside the zone, so it is necessary to reasonably coordinate the legal application mechanism inside and outside the FTZ. Define the jurisdiction of enterprises with dual identities within and outside the district

and specify the legal restrictions on such enterprises so that there are laws to be followed in case of problems. Therefore, it plays an important role to construct the law application mechanism of interaction between the region and outside the region. Fourth, regional legislation. On October 1, 2013, the China (Shanghai) pilot FTZ (FTZ) officially came into effect. However, most of the other FTZ management systems in the zone are internal departmental management regulations, lacking universality and extensibility.

Defects of the “negative list” model

First, the quality of the negative list is not high. The original intention of the negative list is to “do whatever is not prohibited by law”, aiming to improve enterprises' freedom of development. However, the content of the negative list covers a wide range, including 190 prohibitions. Although the number of negative lists has been decreasing, nearly 30 restrictions and prohibitions have been recorded to date.

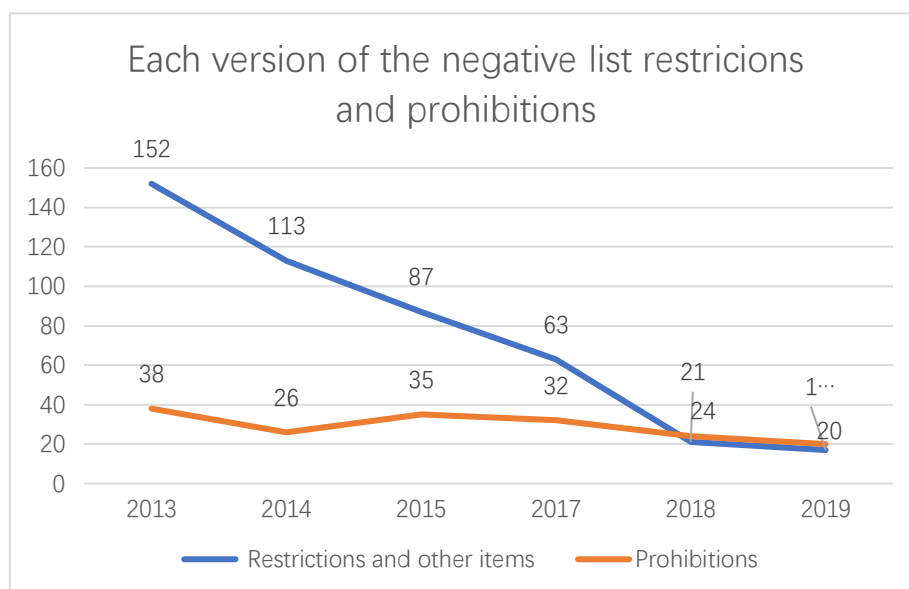


Figure 4 - Each version of the negative list restrictions and prohibitions

Resource: <https://www.gov.cn/>

Second, there are hidden barriers. The feature of the negative list management model is that all enterprises are free to join the industries not prohibited in the list. However, the current approval management system and fund management methods are not clear, which creates an invisible obstacle to the development of the negative list. Third, the criterion of investment admittance is not clear. The lack of clearly defined criteria for foreign investment makes the scope of application of some of the prohibitions on the list vague. Fourth, governments are not easily transformed intelligently. The negative list is a relatively new market management model, which requires the government to make corresponding changes in order to play its role. However, the government has been used to the contract approval system, so it needs to revise relevant rules and regulations to ensure the realization of the new innovation system. This is an arduous project, and it is difficult to realize in a short time.

Based on the above analysis, the strategic analysis matrix is obtained (table 3 and table 4). The alternative scheme of logistics development model of Shanghai FTZ will be formulated according to this analysis matrix.

Table 3 - The types and objectives of the influencing factors

<div> <div></div> <div>Internal factors</div> <div>External factors</div> </div>		F1: Strength	F2: Weakness
		Geographical advantages	Logistics enterprises lack competitiveness
		High participation of logistics enterprises	Insufficient trade environment
		Abundant logistics practitioners	Low informatization level
		Reasonable supervision mode	Backward logistics infrastructure
			Lack of service quality
			Lack of logistics professionals
F3: Opportunity	Sound development momentum	SO Strategy	WO Strategy
	Innovative development model		
	National policy support		
	Increasing demand		
F4: Threat	Competitive environment	ST Strategy	WT Strategy
	Trade and investment risks		
	The legal environment is not sound enough		
	Defects of the “negative list” model		

Table 4 - Development strategy analysis matrix

	Strengths	Weaknesses
Opportunities	SO strategy: fully grasp the development opportunities given by the government and the international environment, give play to its own advantages, actively engage in financial cooperation and strategic interaction with other countries, and strengthen trade and investment.	WO strategy: to see clearly their own shortcomings, to strengthen logistics service quality and logistics information management technology level, to actively learn foreign advanced management mode, at the same time grasp the government policy support and other opportunities, can work with other logistics industry in the world to build an international logistics network.
Threats	ST strategy: make use of the location advantage and talent advantage to expand the connection with the hinterland, establish a logistics center in the main hub area of the hinterland radiated by the FTZ, and avoid external threats to the maximum extent.	WT strategy: evaluate external risks, strengthen the construction of the legal system, and improve the legal environment for the development of logistics in the FTZ. At the same time, to make up for their own shortcomings, through the establishment of horizontal and vertical strategic alliances among enterprises, to improve the overall competitiveness of the FTZ.

4.2 Determination of objective and weight

According to the previous analysis of the logistics development in Shanghai FTZ, the specific objectives of the logistics development in Shanghai FTZ are shown in table 2.

Calculate weights and consistency check

According to the different requirements of the development model of Shanghai FTZ, the more traditional analytic hierarchy process is applied to compare the above objectives of Shanghai FTZ according to their importance to the development of logistics, so as to determine the weight value of each goal.

10 industry experts in logistics enterprises in FTZ and 10 professional scholars studying logistics management are invited to score the objectives proposed in this dissertation according to the degree of importance. The scoring standard is set as equally important, slightly important, obviously important and highly important, and the score value is assigned to 1, 3, 5 and 7 respectively as shown in table 6. The statistical results are shown in the table 7. During the scoring process, the experts should do it independently. After the summary and statistics of the experts, the following evaluation results are obtained.

Table 5 – The implication of importance scale

Importance scale	Implication
1	The comparison of the two elements is of equal importance.
3	Two elements are compared, the former is slightly more important than the latter.
5	Two elements are compared, the former is obviously more important than the latter.
7	Two elements are compared, the former is highly more important than the latter.
Reciprocal	The situation of the latter is more important than the former.

Table 6 - Questionnaire survey original data sheet

	1/7	1/5	1/3	1	3	5	7	SUM
F1-F2	-	-	2	5	10	3	-	20
F1-F3	-	-	1	-	7	9	4	20
F1-F4	1	-	2	7	10	3	-	20
F2-F3	-	-	4	9	8	3	-	20
F2-F4	-	1	8	11	8	1	-	20
F3-F4	-	1	3	12	7	1	-	20

Table 7 - The objective judgement matrix

	F ₁	F ₂	F ₃	F ₄
F ₁	1	2.5333	4.4921	2.2961
F ₂		1	2.0556	1.4782
F ₃			1	1.6333
F ₄				1

Table 8 - Normalized matrix

	F ₁	F ₂	F ₃	F ₄
F ₁	0.4871	0.5394	0.5255	0.3976
F ₂	0.1923	0.2129	0.2405	0.2560
F ₃	0.1084	0.1036	0.1170	0.1732
F ₄	0.2122	0.1441	0.1170	0.1732

The row sum: $\begin{bmatrix} 1.9497 \\ 0.9017 \\ 0.5022 \\ 0.6464 \end{bmatrix}$

The eigenvector w is obtained after normalization,

$$w = (0.487, 0.225, 0.126, 0.162)^T$$

Verify the satisfactory consistency of the judgment matrix A. If $CR = CI/RI < 0.1$, then the consistency passes.

$$CI = (\lambda_{\max} - n) / (n - 1) \quad (6)$$

$$\lambda_{\max} = \sum_{i=1}^n \frac{(Aw)_i}{nw_i} \quad (7)$$

Table 9 - Consistency check sheet

n	1	2	3	4	5	6	7	8
R.I.	0	0	0.52	0.89	1.12	1.26	1.36	1.41

According to formula (6) (7), $CI = 0.0173$. According to the table, when $n=4$, $RI=0.89$, thus, $CR = 0.0194 < 0.1$, indicating that the matrix has achieved satisfactory

consistency. The weights of F1, F2, F3 and F4 are respectively $w = (0.487, 0.225, 0.126, 0.162)^T$

4.3 Alternatives to the logistics development model

According to the current development situation of logistics industry in Shanghai FTZ, it is necessary to put forward alternative plans for the development model of logistics system. By taking the above objectives and the internal and external environment of the logistics industry of Shanghai FTZ as references, and independently formulating an alternative plan. After summarizing and sorting, 4 alternative schemes are shown as follows.

S1: SO strategy-logistics development mode under the “One Belt and One Road” initiative

The logistics industry of Shanghai FTZ can, according to the development characteristics of Shanghai FTZ, fully grasp the development opportunities given by the government and the international environment, combine the development requirements of “One Belt and One Road”, give play to its own advantages, and formulate countermeasures and Suggestions in line with the development of Shanghai FTZ logistics.

First, expand economic and trade investment. Should push enterprises to actively apply for silk road corresponding funds, the investment bank and the BRICS development funds specifically for multiple financial institutions of the “region” project funds, strengthen the area and the overseas investment of Shanghai FTZ logistics related infrastructure, and to the organic combination of trade and investment,

promote trade and investment of the benign interaction. It is suggested to set up a “One Belt and One Road” regional investment promotion association in Shanghai to improve the quality and level of trade and investment in the countries along the “One Belt and One Road” FTZ and the “One Belt and One Road”, so as to further play the role of investment in promoting trade. Positive and “neighbourhood” countries and cities signed the memorandum of economic strategic partnership, strengthen bilateral economic and trade, finance, cultural exchanges and cooperation, to establish a close and friendly cooperation mechanism, set up the diversity of regional cooperation platform, promote FTZ of Shanghai logistics industry status and influence in constructing the area.

Second, expand financial cooperation. Opening up markets in the financial sector to meet the requirements of financial opening under the new international situation of “One Belt and One Road” opening-up. Shanghai FTZ should work to integrate the silk road fund into the silk road fund and strengthen financial cooperation in northeast Asia. encouraging the development of offshore financial services, promoting business innovation in pilot institutions, and support insurance institutions in carrying out offshore insurance services. Step up efforts to attract foreign investment in the financial sector, strengthen the ranks of foreign-funded financial institutions, strengthen international financial exchanges and cooperation, and establish an international financial forum to absorb the fruits of international financial theory. To encourage the development of equity and commodity trading markets, and explore the linkage between the futures market and the spot market.

Third, strengthen infrastructure construction. By virtue of the “One Belt and One Road” strategy, the development of a number of friendly ports with east Asia , Europe and other countries can be accelerated, and the port network of Shanghai along the maritime silk road on the basis of the existing shipping route network and friendly ports is increased. Focus on optimizing the environment and functions of ports,

standardize the construction of port facilities in accordance with the requirements of “overall planning, intensive sharing, convenient access and effective supervision”, increase investment in port infrastructure construction and equipment purchase, and effectively raise the level of sharing and sharing of inspection sites, inspection equipment and supervision. Construction of sea-rail combined transport. On the other hand, the government should strengthen cooperation with inland provinces, actively participate in the construction of the silk road economic corridor, promote the construction of railway connectivity with neighboring countries, and take the opportunity of strengthening the railway transport capacity to promote the development of Shanghai combined transport by land and sea. In addition, focus on building a multimodal transport platform, improving the information service level of multimodal transport, promoting the standardization of multimodal transport, and improving the relevant policy system is also important. The cooperation with e-ports under the belt and road initiative will actively promote the construction of a “single window” for international trade at ports, and realize the sharing of law enforcement information and data information at ports.

S2: ST strategy - development mode of regional logistics system

The logistics industry of Shanghai FTZ should actively make use of its geographical advantages and talent advantages to expand its connection with the hinterland and establish a logistics center in the main hub areas of the hinterland radiated by the FTZ. For example, the development mode of regional logistics system should be carried out while avoiding external threats to the maximum extent. The development mode of regional logistics refers to the systematic development mode of logistics industry in Shanghai FTZ from the logistics park to the logistics center and then to the distribution center to build a hierarchical regional logistics node system. Specifically speaking, the establishment of logistics parks in the FTZ, the establishment of logistics centers in the

main hub areas radiating from the hinterland of the FTZ, and the establishment of distribution centers in the surrounding small and medium-sized cities and small and medium-sized enterprises, among which the key lies in the effective connection among the three.

In terms of logistics park construction, according to the domestic and foreign development experience, the construction of logistics park of Shanghai FTZ logistics park can logistics enterprises as the main body, make full use of its logistics operation resources scale advantages, can not only improve the efficiency of the logistics operation and management, at the same time also can reduce logistics costs, to achieve the effective allocation of resources. In addition, under the macroscopic policy for the implementation of relying on, gradually achieve the introduction to logistics environment as the carrier of industrial and commercial enterprises, to strengthen the logistics park and logistics resources integration, make logistics park more adapt to the development of international container multimodal transport has gradually common demand, so as to promote free trade competitiveness in an all-round way. In terms of logistics center construction, Shanghai FTZ will attract many international logistics enterprises to settle in the future. The expansion of shipping transit volume will drive international trade transfer, and the logistics center within the system will also thrive. Therefore, the construction of logistics center should pay attention to expand the scale of the center by virtue of its own geographical advantages, form the industrial aggregation effect, and develop in step with the international service. Meanwhile, attention should be paid to the construction of railway and highway, especially the construction of traffic facilities at the entrance and exit of the main road. In the construction of distribution centers, they should strengthen the transshipment and grouping of goods in urban areas and in external transportation, improve the efficiency of distribution and improve the ability to work with accuracy, reduce manual operation as much as possible, and increase the frequency of use of machines and computers,

such as the use of scanners to scan the quantity system and confirm the notification system.

Overall, facing the complex situation of inside and outside Shanghai FTZ, Shanghai FTZ construction of regional logistics system model is a huge and difficult task, any changes need to be step by step, not rush, need to be in the logistics personnel, policy, regulation and infrastructure has made certain base after qualitative breakthrough can be achieved. On the other hand, through the in-depth analysis of the modern logistics innovation and development of the FTZ, the defects should be grasped in the current system and resolutely discard the rules and regulations and even laws and regulations that hinder development. With preferential and open policies and advanced management methods, it will attract domestic and foreign excellent logistics service enterprises to enter the Shanghai FTZ, so as to provide the FTZ with the management mechanism of regional logistics system mode that keeps pace with The Times, and provide reference for the overall development of the Shanghai FTZ.

S3: WO strategy - mesh layout pattern

The network layout pattern refers to the network logistics system which is formed with each region as the node. The regional node here refers to the international ports in the world. These ports often have strong capital and advanced management concepts. The port logistics cluster formed by them can realize mutual benefit and promote the economic development of the whole port hinterland. For the logistics industry of Shanghai FTZ, it can build an international logistics network together with other logistics industries in the world.

From the perspective of investment subject, the investment subject of network layout includes two kinds, which also determine the node set in the logistics network. One is the investor of large ship enterprises, such as Maersk. Maersk currently has the largest shipping trade volume in the world. Its shipping network is all over the world,

and container terminals are set up in every major port in the world. The other is port operators such as Hutchison Whampoa, Singapore's PSA, Dubai's dp world and China merchants international. For example, Hutchison Whampoa port started from operating Hong Kong's Kwai Chung container terminal, and then spread its successful port terminal operation and management experience to the world. As a necessary complement to Hutchison port, Hutchison Whampoa's Hutchison delta port mainly operates three coastal ports and three inland river ports in south China. At present, the operation scale of the port has spread all over the world, playing an important role in the international maritime freight transport. At present, it has 42 ports and its business volume covers major trading regions such as Asia, Europe and the Americas.

The construction of network layout mode requires the logistics industry of Shanghai FTZ to actively promote the integration of ports with international standards, that is, deep-water, specialized and large-scale. We should also attach importance to supporting modern container transfer stations, government supervision service platforms and business centers to promote the comprehensive handling capacity of logistics. This will not only improve the important position of logistics industry in Shanghai FTZ in the international logistics network, but also attract more domestic goods to dock, complete the separation and integration business, and improve the logistics transfer volume and economic benefits of the FTZ. On the other hand, the layout of international network needs to build a modern logistics system integrating commercial flow, information flow and capital flow, so as to ensure that international cargo transportation can be fast, real-time and accurate. Among them, network technology will play a key role in establishing a comprehensive logistics information platform including the logistics park within the Shanghai FTZ, surrounding trade enterprises, customs and government departments, and adopting EDI data transmission to ensure the timeliness and authenticity of information resources.

S4: WT strategy-supply chain alliance model

The logistics industry of Shanghai FTZ should pay attention to resist external threats, evaluate external risks, strengthen the construction of legal system and improve the legal environment for the development of FTZ logistics. At the same time, to make up for their own shortcomings, through the establishment of horizontal and vertical strategic alliances among enterprises, to improve the overall competitiveness of the FTZ. Strategic alliances can be divided into two categories: one is the horizontal alliance formed by logistics enterprises in the FTZ, and the other is the vertical alliance formed by logistics enterprises and logistics service demand enterprises.

The establishment of strategic alliances among logistics enterprises in the Shanghai FTZ can, first of all, realize resource sharing among Allies, expand their business scope, establish regional economic groups, and realize large-scale economy. Secondly, through alliance cooperation, each joining enterprise can promote and influence each other, promote the logistics technology innovation of the FTZ by strengthening technical exchange, and jointly improve relevant technical standards. Finally, the vertical association of logistics enterprises in the FTZ helps them to realize diversified operation, improve the overall competitive strength of the FTZ, provide guarantee for logistics enterprises to obtain key resources, and expand the scope of self-sustaining operation. The horizontal alliance mainly focuses on the collaborative development of logistics enterprises in the area. By integrating and distributing the logistics resources of enterprises, it improves the rationality and utilization rate of resource allocation, and handles the reasonable division of labor and functional positioning of logistics enterprises in the area. For example, experience in international transport and trade logistics enterprises to enhance the foreign business, has developed the domestic transportation system of logistics enterprise is mainly responsible for domestic business, through reasonable planning, complementary advantages, improve the domestic export and import logistics operational efficiency of

the node in the FTZ, at the same time maintain good public relations between the logistics enterprises, achieve a win-win situation. FTZ logistics enterprise alliance organizations can carry out internal training, share excellent management experience, share part of the infrastructure and logistics information, and establish simple cooperation procedures. In the actual cooperation process, the coordination between each other can be improved and the efficiency can be improved. Meanwhile, the operation cost will be reduced and the market competitiveness of the organization can be enhanced.

Shanghai FTZ logistics enterprises and logistics demand enterprises alliance mainly to deal with the pressure of both sides. From the perspective of logistics demand side, in order to focus on their core business, enterprises will outsource the product logistics business, which can not only significantly reduce the operating pressure of enterprises and reduce the overall investment, but also reduce their logistics costs and accelerate the product circulation efficiency, and at the same time, they can have more professional logistics services. From the perspective of logistics suppliers, with the increasing number of logistics enterprises, the profits generated by traditional logistics profit methods such as transportation and storage are getting lower and lower, which makes logistics enterprises need to expand their business scope and dig deeper development mode. Logistics enterprises and logistics demand enterprises to form an alliance, on the one hand can provide a stable supply of goods for logistics enterprises to ensure the stable development of enterprises, on the other hand to provide high quality logistics services for logistics demand enterprises to reduce the investment of enterprise capital and energy. Logistics enterprises can consolidate the alliance relationship through reasonable preferential policies and better logistics services, establish a good market reputation and public praise, expand the number of allied enterprises, and constantly expand the scope of business.

The horizontal alliance among logistics enterprises in the Shanghai FTZ can

improve the market competitiveness of alliance members, guarantee a more perfect logistics service system in the FTZ, and improve the quality of logistics service in the FTZ. The alliance between logistics enterprises and logistics service demand enterprises can provide a stable source of profits for logistics enterprises, guarantee their healthy and stable development, and further promote the construction of Shanghai FTZ.

It can be seen that the four development modes mentioned above intersect each other in content and can learn from each other. Therefore, this dissertation will make a decision on the priority order of these four development modes by combining with the specific objectives of logistics development in Shanghai FTZ and applying the grey decision-making method.

4.4 Determination of alternative logistics development mode

Considering that each alternative is in practice, especially for different goals, the degree of realization will vary. Here using a scoring method to quantify the feasibility of different alternatives under different goals. 5 grades are set as very high, high, slightly high, slightly low and very low, and assign 5, 4, 3, 2 and 1 scores to them.

10 industry experts in logistics enterprises in FTZ and 10 professional scholars studying logistics management are invited to score the optimization scheme, and each expert gave a separate score. After sorting and screening, the following evaluation results are obtained

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Table 10 - Original questionnaire scores for each scheme

		1	2	3	4	5	SUM
S1	F1	-	2	7	10	1	20
	F2	1	8	7	3	1	20
	F3	-	3	8	6	3	20
	F4	-	9	9	2	-	20
S2	F1	-	-	2	7	11	20
	F2	-	5	8	6	1	20
	F3	-	4	4	8	4	20
	F4	7	9	3	1	-	20
S3	F1	-	-	4	10	6	20
	F2	1	2	9	8	0	20
	F3	-	-	2	6	12	20
	F4	-	5	10	4	1	20
S4	F1	2	8	9	1	-	20
	F2	3	10	6	-	1	20
	F3	-	1	8	9	2	20
	F4	2	8	6	3	1	20

Table 11 - The effect sample value of each scheme

	F1	F2	F3	F4
S1	3.50	2.75	3.45	2.65
S2	4.45	3.15	3.60	1.90
S3	4.10	3.20	4.50	3.05
S4	2.45	2.30	3.60	2.65

Since the development objectives of the logistics system of the FTZ (F1, F2, F3, F4) are efficiency objectives, formula (3) is used to transform the effect sample matrix U into the decision matrix R .

According to formula (2):

$$z_1=3.6250,$$

$$z_2=2.8500,$$

$$z_3=3.7875,$$

$$z_4=2.5625$$

$$\text{eg: } r_{11} = \frac{r_{11}-z_1}{\max (r_{21}-z_1, z_1-r_{41})} = \frac{3.50-3.625}{\max (4.45-3.625, 3.625-2.45)} = 0.1064,$$

$$R = \begin{bmatrix} 0.1064 & -0.1818 & 0.4737 & 0.1321 \\ 0.7021 & 0.5455 & 0.2632 & -1.000 \\ 0.4043 & 0.6364 & 1.000 & 0.7358 \\ -0.100 & -0.100 & -0.2632 & 0.1321 \end{bmatrix}$$

Get the optimal decision vector:

$$r = (0.7021, 0.6364, 1.0000, 0.7358)$$

According to formula (6), calculate the target distance of each scheme:

$$\varepsilon_1=0.895, \quad \varepsilon_2=0.830, \quad \varepsilon_3=0.208, \quad \varepsilon_4=1.508$$

Sorting by the value of $\varepsilon_i (i=1,2,3,4)$ from small to large, the sorting of scheme $S_i (i=1,2,3,4)$ can be obtained as $S_3 > S_2 > S_1 > S_4$.

Results analysis

According to the principle, the smaller the I value is, the closer to the optimal scheme. Among the alternative schemes for the logistics development model of Shanghai FTZ, S3 is the most preferential development scheme, and then S2, S1 and S4 are implemented successively. In other words, first of all, the Shanghai FTZ should increase investment to build a network logistics system, and focus on improving the important position of the logistics industry in the Shanghai FTZ in the international logistics network. Secondly, the logistics industry in the Shanghai FTZ constructs a systematic development model from the logistics park to the logistics center and then to the distribution center, and constructs a hierarchical regional logistics node system. Thirdly, with the help of the “One Belt and One Road” strategy, it will certainly

accelerate the development of a number of friendly ports with east Asia, Europe and other countries, and increase the port network of Shanghai along the maritime silk road on the basis of the existing shipping route network and friendly ports. Finally, strengthen the establishment of strategic alliances between logistics enterprises in Shanghai FTZ, as well as strategic alliances between logistics enterprises in Shanghai FTZ and enterprises with logistics needs.

5 Suggestions and conclusion

Actively introduce high-quality logistics management personnel

The shortage of high-quality logistics talents seems to be a weakness in the development of logistics in Shanghai FTZ. The FTZ should launch the adjustment plan as soon as possible, especially focus on the introduction and training of high-quality logistics talents, so as to assist the smooth operation of the logistics development model in Shanghai FTZ. First of all, for the ability to work with high level of logistics personnel, should give full of differential treatment, not only to meet the basic needs, should also reflect different with other employee compensation package, such as providing high-grade accommodation, office environment and more favorable and convenient medical conditions, attaches great importance to the logistics personnel. In addition, an incentive mechanism should be established for logistics talents, and a set of rigorous and effective legal system should be set up to supervise and cooperate with them, so as to encourage talents to start businesses and provide more opportunities for talents to study abroad.

Logistics training for enterprise employees is another important way to cultivate high-quality talents. It can improve the enthusiasm of enterprises and employees to participate in logistics training by implementing the talent rating and other methods. To make full use of outstanding talents, FTZ should launch the incentive policy for outstanding logistics talents, encourage logistics practitioners and researchers to continuously stimulate innovation, create a good academic atmosphere, and enhance the attraction and vitality of FTZ.

In addition, the joint cultivation and flow of Shanghai logistics talents is the

key to the development of logistics in Shanghai FTZ. As a city with abundant scientific and technological resources and intensive university talents, the municipal government should obtain high-end logistics talents suitable for the logistics system construction of Shanghai FTZ through the joint training among universities. Logistics enterprises in FTZ should cooperate with universities to train logistics talents, and logistics enterprises can set up orienteering scholarships in relevant universities. After signing relevant agreements with students who are interested in the logistics industry, the enterprises will be responsible for the students' study expenses during the university period, and the students will go to work for the corresponding logistics enterprises in the FTZ after graduation.

Accelerate the construction of logistics infrastructure

Modern logistics technology and facilities have gradually become one of the competitive cores in the market. If the Shanghai FTZ wants to realize the development mode of supply chain alliance, it is more necessary to attach great importance to this aspect. Logistics concept and logistics technology are facing the subversive development. However, as far as the current situation is concerned, the upgrading of logistics infrastructure has not been synchronized with the demand for logistics development. It can be said that the development of logistics industry in the FTZ has suffered a great negative impact, and advanced logistics infrastructure is a necessary prerequisite for the establishment of a modern logistics system. In terms of financial support, while increasing the investment in the construction of logistics infrastructure, it is also necessary to encourage logistics enterprises to independently finance the construction of infrastructure through a variety of channels. For foreign resources, logistics enterprises should not only actively attract external funds, but also actively learn from foreign advanced infrastructure construction experience.

In terms of infrastructure construction, the following tasks is needed to

accomplish. First, a complete overland transport network needs to be established as soon as possible. Second, it is necessary to establish a logistics system with a logistics park as the hub and based on the distribution center and storage network. Third, accelerate the construction of a logistics information exchange system based on the Internet. Fourth, in the air cargo transport equipment, as soon as possible to achieve integration and standardization. And should make reasonable arrangement and allocation to construction fund. Learn from the overseas advanced logistics infrastructure construction experience, and strive to invest less capital in a short period of time to build the logistics infrastructure in line with the development of the logistics system of Shanghai FTZ. At the same time, logistics service enterprises in the FTZ can try to adopt the mode of joint development and jointly build the infrastructure that meets the requirements of modern logistics to reduce the construction cost of capital and time and reduce the pressure of logistics infrastructure construction. In the process of joint construction, enterprises can make full use of their strengths and avoid their weaknesses, fully gather the advantages of each enterprise, and build a high-level logistics infrastructure in a relatively short period of time, so as to rapidly improve the international competition level of the Shanghai FTZ, and drive the business volume of logistics enterprises in the FTZ and promote their own development.

Improve the reform of logistics management system

Modern logistics industry has put forward higher and different requirements on logistics management system, which also leads to unbalanced and out-of-sync development of logistics enterprises, especially in the distribution of resources in finance, transportation facilities, including sea and highway. There is not a set of reasonable coordination mechanism between various departments and regions, resulting in a state of division in the logistics industry. Logistics management system needs a set of sound and effective regulatory system, otherwise it will not be able to be

carried out in accordance with a unified standard. In this regard, we can actively learn from the countries that have reached the advanced level in this aspect, learn from the management mode, and optimize the management system based on the current characteristics of the FTZ, so as to establish a modern logistics development plan with the characteristics of the Shanghai FTZ. At the same time, the regulation rules and regulations should be standardized, the existing loopholes in the current system should be timely modified, the problem should be solved in the first place, and the service quality and logistics efficiency should be improved as an important goal. On the other hand, to pay attention to the coordination between departments is also an important aspect of improving the logistics management system, which is conducive to the construction of a standardized modern logistics market system.

Attach importance to the coordinated development of transportation

Transportation, as the carrier of logistics industry, is one of the main factors related to logistics efficiency and the key to the innovative development of logistics in Shanghai FTZ. It is also the basis for the synergy between Shanghai FTZ and other regions. First of all, the utilization efficiency of Shanghai's transportation infrastructure needs to be further improved, and regional logistics nodes should be planned as a whole. The construction of efficient transportation network within and between cities in Shanghai still needs to be strengthened. Secondly, through the coordination of the local government, the components of the logistics system are organically connected through the advanced information exchange platform. For example, highway and railway transport systems should be connected with ports and airlines, and we should actively advocate the development model of “sea-land-air”, “land-sea” and “land-air” combined transport systems, and make use of modern and advanced information technology to promote the green, efficient and convenient development of transport systems. Thirdly, the transportation resources in Shanghai should be unified and

redistributed. On the one hand, it can make full use of the advantages of various transport enterprises, coordinate their functions and interests, and eliminate the complex situation of “scattered and disorderly” through merger, reorganization and cooperation. On the other hand, reasonable coordination and division of labor should be carried out among the major airports and ports in the region, change the previous homogeneous competitive relationship, and build an international shipping network with global coverage and orderly operation. On the basis of the optimization of the transportation network, we should actively promote the transformation and upgrading of trade modes, attach equal importance to domestic and international trade, and vigorously promote the development of offshore business of enterprises in the FTZ, so as to lay a good foundation for the integrated development of domestic and foreign trade. In addition, it is important to improve the quality of international shipping services and make full use of the advantages of various ports in Shanghai, such as Waigaoqiao port and Yangshan port, so as to establish a shipping operation mode with international influence.

Rationally plan the investment in the logistics industry

It can be seen from the current situation that the logistics supply capacity of Shanghai FTZ is still in short supply. The current situation of logistics supply capacity can be improved to a certain extent by increasing the investment in fixed assets and self-investment in logistics. Therefore, the Shanghai FTZ can meet the increasing demand for logistics by rationally planning the investment in the logistics industry. On the one hand, targeted investment in the logistics industry should be taken. Firstly, it is necessary to find out the factors that limit the logistics supply capacity of Shanghai FTZ, and then make the investment plan according to different problems. For example, Donghai bridge is currently the main freight channel leading to Yangshan bonded port area of Shanghai FTZ. There is a serious crowding phenomenon, which greatly

restricts the operation efficiency of the logistics system of the FTZ. The administrative department of Shanghai FTZ should strengthen the investment and construction, improve the capacity of freight traffic and relieve the pressure of freight traffic.

In terms of strategic location, the Yangtze river delta is the strategic hinterland of Shanghai port facing northeast Asia, and the pearl river delta is the main strategic hinterland of Hong Kong port facing southeast Asia. It is not difficult to see that Shanghai can take Hong Kong as its cooperative partner. In this process, the Shanghai FTZ can make full use of the existing resources in Hong Kong to inject Hong Kong talents, technology, capital and other resources into the Shanghai FTZ. At the same time, it can also bring valuable experience of Hong Kong to promote the development of logistics in the two places through cooperation.

Conclusion

This dissertation made a preliminary study on the logistics system development model of Shanghai FTZ, and achieved certain results. The specific research conclusions and results are as follows:

A decision-making model of logistics development mode in Shanghai FTZ was established through multi-index grey target decision-making method. This decision-making process not only proved that grey theory can be applied to the development of logistics system in FTZ, but also verified its practicality and operability.

It provides a targeted development model for the logistics development of Shanghai FTZ. That is to increase investment in the construction of network logistics system, to build a systematic development model from the logistics zone to the logistics center and then to the distribution center, and to construct a hierarchical regional logistics node system. With the help of the “One Belt and One Road” strategy, it will accelerate the development of a number of friendly ports with relevant countries

in east Asia and Europe, and increase the port network of Shanghai along the maritime silk road on the basis of the existing shipping route network and friendly ports. Finally, to strengthen the strategic alliance among logistics enterprises in Shanghai FTZ.

However, due to the limitations of various conditions, this dissertation still has some shortcomings:

The logistics system of Shanghai FTZ is an extremely complex system that integrates many internal factors such as advantages, disadvantages, opportunities and challenges. Due to limited personal ability and objective conditions, this dissertation fails to take into account all the environmental factors related to the logistics system of Shanghai FTZ. For example, Shanghai FTZ tax policy, customs clearance policy and other factors such as convenience and logistics information technology level. Therefore, these factors will be taken into consideration in the follow-up study.

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Appendix (I) Questionnaire of experts on the objective of Shanghai

FTZ based on its importance to the development of logistics

Instructions: Please compare the goals F₁, F₂, F₃ and F₄ in pairs according to their importance to logistics development. The scoring standard is set as very important, important, slightly important and equally important. The score is given to 7, 5, 3 and 1 points respectively.

The contents of targets F₁, F₂, F₃ and F₄ are shown below.

F1: Strength	F2: Weakness
Geographical advantages	Logistics enterprises lack competitiveness
High participation of logistics enterprises	Insufficient trade environment
Abundant logistics practitioners	Low informatization level
Reasonable supervision mode	Backward logistics infrastructure
	Lack of service quality
	Lack of logistics professionals
F3: Opportunity	F4: Threat
Sound development momentum	Competitive environment
Innovative development model	Trade and investment risks
National policy support	The legal environment is not sound enough
Increasing demand	Defects of the "negative list" model

For example, if you think F₁ is important compared to F₂, fill in 7 at a in the table. In addition, if number is filled in a, no number is filled in b corresponding to a, we will carry out subsequent processing. Thank you for your cooperation!

	F ₁	F ₂	F ₃	F ₄
F ₁	1	a		
F ₂	b	1		
F ₃			1	
F ₄				1

Appendix (II): Expert questionnaire on the expected performance of different alternatives under different objectives

First of all, thank you very much for taking time out of your busy schedule to fill in this questionnaire. Thank you for your industry support! This questionnaire uses anonymous means to conduct several rounds of correspondence to solicit expert opinions. This questionnaire is sent to you anonymously. Your information will only be used for statistical analysis. In order to ensure the accuracy and efficiency of the questionnaire, please send it back within weeks after receiving the questionnaire. The period will be invalid.

Instructions Please rate the expected performance of different alternatives for logistics development of Shanghai FTZ under different goals. We have set 5 grades, which are very high, high, slightly high, slightly low, and very low, and give 5, 4, 3, 2, and 1 points respectively. Please fill in the form.

	F1	F2	F3	F4
S1				
S2				
S3				
S4				

The original questionnaire contains the contents of various alternatives and objectives, but it will not be shown here because there are relevant contents in the dissertation.