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China's inland port development model

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China's Inland Port Development Model

A case study of Xi'an inland port

By

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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.

Dong Siyu
2019-07-03

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Abstract

This thesis mainly conducts the research on the development model of inland ports in China. It researches the current domestic and foreign contents on the construction of inland ports through literature review. Among them, the concept and function of inland port and its development model are explored and summarized through the way of literature synthesis, which is also the premise of the whole thesis. On the basis of literature survey, this thesis analyzes the construction model of inland ports in China. Taking Xi'an Inland Port as a case, it conducts the model establishment through the method of Fuzzy Analytic Hierarchy Process (FAHP).

Currently, there will be many constraints in the development of Xi'an Inland Port. In combination with the current constraints on Xi'an Inland Port as well as the Fuzzy Analytic Hierarchy Process (FAHP), this thesis holds that in the construction of Xi'an Inland Port, it needs to develop toward the direction of an international transshipment inland port in order to have a stronger momentum of development at present. Therefore, it is concluded that Xi'an Inland Port needs to make better use of resources in its construction and development. Moreover, it needs to take advantage of its geographical advantages, strive for policy supports, perfect its construction of traffic network, and position it as an international transshipment inland port, so as to maintain the greatest development potential.

Key words: inland port; development model; Xi'an Inland Port; international transshipment inland port

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1 Introduction

1.1. Research Background

Currently, with the further deepening of the economic globalization trend as well as the rapid progress of container transportation and relevant logistics technology in the world, maritime transportation has gradually become the leading direction of international logistics. The research on inland port mainly aims at the docking between the multi-transportation mode of the seaports' inland extension and the coastal ports, which can better promote the rapid development of inland economy with the help of inland ports, and accomplish the rapid transformation from its economy to marine economy simultaneously. Therefore, for inland cities, the construction of inland ports is of great significance. The emergence of inland ports dates back to the 1950s, when the new business—container transport appears in shipping industry. Moreover, standards for container transport business were issued successively, which also made the birth and development of the international multimodal transport. The emergence of this new model has also enhanced the competition between ports to enhance a larger platform. In this case, the port should better achieve its additional value-added services, and develop its functions. As the hub port of international freight transportation as well as the intermediate platform of the international economy & trade, it plays a positive role in the economic growth and resource element allocation of relevant economic regions. The inland port can effectively broaden the radiation area of inland, and then become the central link of production and consumption in the new period. Meanwhile, it can also better participate in inland hinterland logistics activities. In particular, with the global international development of communication in the world, the shipping industry will have a better space for its development.

In the 1980s, China began to introduce the construction of inland ports. The original introducing intention was only to take it as an inland port, and to form trade exchanges with the inland areas of relevant countries, which did not exercise the basic duties of inland port at first. At the beginning of this century, China's coastal ports began to build inland ports. The main causes for the construction of inland ports in China are as follows: first of all, there are different degrees of expansion among the major seaports, which also makes the competition between different seaports increasingly fierce. The goal of competition is mainly for the acquisition of ports and inland resources, which is especially reflected in the current stage of the acceleration of wharf construction. The corresponding competition becomes fiercer and fiercer. Due to the limited throughput of the port wharf as well as the rapid development of the corresponding shipbuilding technology, the throughput capacity of the wharf port should be continuously improved so as to meet the requirements of the use of large ships. Secondly, with the rapid development of China's current economy, it is also necessary to carry out better economic and trade links with domestic and foreign related regions. Meanwhile, due to the increasing flow of goods by sea, it is necessary for China's ports to continuously improve their supply & demand capacity as well as shipping capacity. In this case, it is necessary to build new inland ports to achieve their own development. Finally, since the port needs its own development, it is necessary to expand the scale of operation and strengthen the relationship with the inland city. For example, in order to transplant some

functions of the port to the inland city, the cargo source should be established. Moreover, it is necessary to implement the mutually beneficial development of the inland city and the port so as to make it have a wider radiation area. With the rapid growth of port trade and the continuous increase of shipping business, container transport has emerged as the times require, and the related technology has also achieved rapid development in recent years. Particularly, in the new era, the competition between international trades is increasing, so it is necessary to better ensure to obtain more supply of cargoes. Therefore, our attention should be gradually shifted from coastal areas to inland areas. This has led to the development of inland transportation. Currently, there are more and more trades between the port and the inland region. In order to facilitate the development of the port and inland, it is necessary to build a logistics station with similar functions to the port. This is the inland port, which is well-known to us.

1.2. Research Significance

For the development of an inland city, the development of port economy can effectively drive the economy of inland city. If a city is in a developed state, the rhythm of material circulation will also be accelerated, which also has higher requirements for the port. With the deepening of the current trend of international financial integration as well as the continuous prosperity of the world economy, it is necessary for inland cities to better participate in the development of the international scope. The domestic trade, foreign trade, and ports are all the best outposts for inland cities. Therefore, the port is a very important content to ensure that cities can occupy their own place in the international scope. Therefore, currently, many inland cities begin to establish their own inland ports, and have great hope for their development. Inland ports can better carry out international container transport business and trans-shipment business. It retains the basic functions of the port, which can better promote the rapid construction and development of inland cities. Meanwhile, it can also expand the economic field of coastal ports, and increase the supply of goods from inland ports, which is of positive significance to improve the efficiency of port operation and promote the construction of cities as well as their surrounding areas.

At present, China has put into operation and construction of inland ports, whose numbers have exceeded 70. The construction of inland port can better promote the economic development of inland cities. Simultaneously, it can also radiate the surrounding areas, and constantly improve the rhythm of material circulation. With the rapid development of economy in the world, inland cities in China are also needed to better participate in international competition. Currently, for the development of inland ports, there is still a certain gap between China and some developed countries, such as many European countries and the United States. These gaps are not only reflected in China's late starting in these aspects, but also in all aspects of the construction, operation, and layout of the whole inland port. Therefore, it is necessary to better combine the operation mode to provide constructive significance for the construction and development of inland ports in China. If the operation mode is copied, it will be a hard-moving case, which is unable to give full play to the value of the inland port by combining regional resources with other strengths. Therefore, we should better combine the original overall planning of the inland port design from the perspective of

regional vision as well as the whole country's development, and make the inland port own a wider radiation range in construction with a higher return rate.

Taking Xi'an inland port as a concrete case, this thesis makes an in-depth research on the current development model of inland ports in China through literature review to understand and research the development policy and specific model of inland ports. The current development modes for inland ports are also compared. Through the establishment of a comprehensive evaluation model for the development of inland ports, this thesis researches Xi'an Inland Port. It mainly finds out the basic problems that affect the development of inland ports in China in the new era, and researches it with specific cases as the basic support. Meanwhile, on the basis of this, it puts forward the countermeasures for the development of inland port in China, and provides effective theoretical supports for the construction and development of inland ports at present. To sum up, through the research of this thesis, taking Xi'an inland port as an example, it has the following positive significances for the development and construction of inland ports in China.

(1) According to the construction of Xi'an Inland Port, this thesis expounds the related concepts, related issues, and distinguishes many contents, such as the inland container transshipment station, inland customs station, freight station, etc. Meanwhile, it determines the demands of each functional part to conduct a concrete analysis on the construction of Xi'an Inland Port. In addition, according to the current situation, it also gives the author’s own viewpoints.

(2) This thesis puts forward a concrete analysis on the current development of the inland port in China. Meanwhile, it analyzes and expounds many factors affecting the construction of the inland port in combination with Xi'an Inland Port, and then fully researches the relevant indexes and systems affecting the development of the inland port, which can provide certain theoretical supports for the inland s city's construction at present.

1.3 Review of Research Literature at Home and Abroad

Since the concept of inland port was first put forward in 1980, the relevant practical application and theoretical research have been continuously developed. The research on it by scholars at home and abroad roughly includes the following aspects:

1.3.1. Researches on the Inland Port's Concept, Function, and Classification

Munford (1980) first put forward the concept of inland port. In the early 1990s, the United States Army Corps of Engineers (USACE) put forward "Inland Port". They used inland port to refer to inland waterway port to distinguish it from seaport. In 1982, UNCTAD (United Nations Association for Trade and Development) first clarified the relevant definition of inland port. Subsequently, the inland port has been constantly revised and improved in the actual operation of the inland port. Leveque and Roso (2002) hold that the inland port is an inland transshipment station to directly connect with the seaport, which possesses a huge transportation load and can enable the consignor to enjoy door-to-door import & export services. Ng and Gujar (2009) describes its related concepts from the perspective of the functions that inland ports should possess as well as the interest subjects of all parties involved. Mr. Xi Ping (2001) is the first person in China to put forward the concept of inland port. In 2005, he further

improved the basic theory of inland port. Most of the existing domestic studies have the same definition, mainly from the roles or functions they should have: Zhu Changzheng, Dong Qianli (2009) think that inland port is an inland logistics node with port function, and they describe the function of inland port in detail. Zhang Rong and Ai Caijuan (2011) define inland ports as a distribution center or transshipment station in inland areas, which carries out effective transport links with seaports. Adolf and Flavio Padilha (2013) propose that inland ports are not only improving inland hinterland access to enhance the competitiveness of ports. Due to the important position of the inland port in the politics and economy of developing countries, it has become an important force in promoting the development of regional integration. Elvira Haezendoncka et al. (2014) propose to measure the relationship between new ports and inland areas by establishing a port-inland impact index matrix. Patrick Witte (2014) also holds that the inland port has become the key node of the global freight chain. However, they argue that inland ports should be treated equally with ports as an independent part of the transport chain. In China, starting with the import and export trade of the inland port, Zhu Changzheng et al. (2009) summarize the basic function of the inland port as follows: export transshipment function, import distribution function, and import & export comprehensive service function. Wu Qitao et al. (2010) propose that the inland port undertakes the transfer of seaports to inland areas, which is the transit node in the port logistics network. It can gather and dredge the goods from the port of transport. Meanwhile, it possesses other functions, including inland ports, international freight forwarders, the third party logistics, information processing, etc. In addition, Li Xiaowen (2011) proposes that the basic functions of inland port should include service functions, such as EDI docking, management information system, etc. Cheng Lulu (2014) analyzes the function of inland port in China from the perspective of the supply chain as well as the interaction between the port and the city. Liu Lanxin (2014) researches the linkage development between Liaoning coastal port and inland port, and put forward the linkage mode of function, information, and policy, which provides a reference for Liaoning's economic development. Liu Hao et al. (2014) conducts the research from the perspective that Xi'an inland port is an important node of international and domestic container transportation in inland areas so as to determine the positioning of its international transitional inland port.

In the classification of inland ports, there are two main classification methods as follows: the first method is to classify them according to the geographical location of inland ports, namely, the distance from the inland port. Roso and Woxenius (2008), Notteboom and Rodrigue (2011) classify inland ports into 3 kinds as follows: the long-distance inland ports, the medium-distance inland ports, and the close-distance inland ports; the second method is to classify them according to the function orientation of inland ports. Zhu Changzheng and Dong Qianli (2010) classify inland ports into 3 types as follows: the import distribution type, the export distribution type, and the import & export comprehensive type.

1.3.2. Research on the Development and Operation Mode of Inland Port

Adolf K.Y.Ng and Flavio Padilha (2013) research the impact of government policies on the operation model of inland ports. Taking the operation of inland ports in

Brazil in developing countries as an example, they analyze the impact of different attitudes of governments on the operation mode of inland ports, and finally confirms that the operation mode and efficiency of inland ports are inextricably linked to the cooperation of relevant government organizations. Patrick et al. (2014) believe that inland ports are independent transport nodes, and they should be paid same attention as coastal ports in operation. In addition to the scale of construction, they hold that the operation mode, system and other parties are also very important. Except that, they apply the challenges faced by ports to inland ports, considering what governance strategies should be established in the face of different positive and negative interests. Xuan Qiu (2015) researches the warehousing pricing of inland ports in depth from the perspective of the specific operation of inland ports, and establishes relevant models. Finally, the results show that reasonable pricing plays an important role in attracting cargo sources to inland ports.

The domestic researches on the inland port development mode mainly aims at an inland port or a region to put forward a qualitative development mode, which rarely considers the linkage between the inland port group and the seaport in the whole area. Wei Yongping and Ma Jianxiao(2010) introduce the two investment modes – the inland cities' self-construction mode and the joint construction mode of inland ports with the seaport. Sun Jiaqing and Tang Limin (2013) establish the selection index system of three inland port development models by applying BP neural network method. Zhi Haijun (2010) puts forward two kinds of coordination modes between inland port and seaport according to different situations: the "bottom-up" operation mechanism and the "top-down" operation mechanism, and puts forward specific realization methods and planning theories for each operation mechanism.

1.3.3. Research on the Current Situation of the Linkage Development between Inland Ports and Seaports

Currently, many scholars, staff of port enterprises, and related institutions conduct the research on the current situation of the inland port's construction and development, and analyze the countermeasures, strategies, and existing problems. On the basis of the role and function of the Russian inland ports, Korovyakovsky, E. (2011) hold that the Russian seaport is too mature or even begins to decline gradually, which has a negative impact on the container capacity of the inland port. Wang Huanming (2008) makes a detailed research on the current situation of inland port construction at home and abroad in order to analyze the feasibility, development strategy, and possible problems of establishing inland port in Chengdu. On the basis of the freight flow, yard station, route and other factors of Tianjin Port in Eurasian Continental Bridge, Liu Yang (2009), analyzes the necessity of establishing the inland port of the Eurasian Continental Bridge in Tianjin Port. Similarly, many scholars have made in-depth researches on the current situation and strategies of inland port construction in Xi'an, Nanning, Nanjing, Guizhou, Shijiazhuang, Nanchang, Jinjiang, and other areas.

With the rapid development of inland ports, the researches on the development direction and mode of inland ports is increasing and deepening at home and abroad. The concept of network system model, the linkage development between seaport and inland port, and the concept of the inland port in international transshipment hub have

been gradually put forward and constantly researched. Andrius Jarzemskis et al. (2007) investigate the opinions and suggestions of ports, container operation enterprises, and related institutions in the Baltic Sea region on the construction of inland ports. From different perspectives, they research how to operate the inland port in order to attract more operators, and then compares and analyzes the operation form of the subject. Bird establishes the Anyport inland port development model. In the model, the development of inland port is summarized as follows: the stage of formation, expansion, consolidation and specialization. However, this model does not find the importance of hinterland. Notteboom' (2005) proposes a model of inland port regionalization. It is considered that the hinterland is the key point of inland port development, and the hinterland is closely related to the hinterland of goods in order to gain the advantage in the competition in the world supply chain. Lu Shunjian et al. (2007) puts forward three modes of inland port development and construction. The three models are established in the following cases: inland cities establish inland ports for economic development; coastal ports cooperate with inland cities to establish inland ports for attracting supply sources; coastal ports and inland cities establish inland ports according to their respective development demands. After that, the characteristics of each model are described respectively. According to the relationship between the freight capacity of inland port containers and the scale of the main port yard, Guan Feng (2008) establishes the scale model of the front and rear yard of the coastal container port so as to grasp how to make full use of the front and rear yard of the home port according to the operation of the inland port. Currently, most inland ports in China are based on the development and construction of seaports, so there are a lot of researches on the linkage development model of seaports. In order to research the linkage development strategy between seaport and inland port, Gou Chennan (2011) concretely researches and analyzes the linkage between logistics industry and information platform, logistics business linkage, etc. On the basis of several aspects, such as information, function, and policy, Liu Lanxin (2011) analyzes the linkage mode between seaport and inland port.

From the above research review, it is found that although the theoretical researches and practical researches on inland ports in foreign countries is similar to the domestic research scope, the researches in foreign countries are superior to domestic researches. Most of the domestic researches are still in the stage of qualitative analysis, and there are few quantitative analysis methods. Moreover, there is little research on the optimization of areas where inland ports have been set up as the main body of the research, which provides a broad space for this thesis to carry out the research on the two-way concurrence between inland ports and coastal ports.

1.4 Research Methodologies and Research Contents

1.4.1. Research Methodologies

The research of the whole thesis is divided into three parts. Firstly, it focuses on literature research. Through the network search for the corresponding literature as well as the retrieval of the literature provides theoretical supports for the expounding of the whole thesis. The literature review runs through the whole thesis. Through the research on the current construction situation of inland ports at home and abroad, it explores the

inherent law, and provides the research foundation. Meanwhile, the foreign related literature survey is applied as the theoretical reference.

Secondly, through the method of combining analysis with induction, it summarizes the collected data. Subsequently, on the basis of this, it conducts comparison and analysis. It draws lessons from some valuable concepts and practices at home and abroad, and combines them with the current situation of the inland port's development in China. Meanwhile, according to the current development model of the inland port as well as the relevant domestic policies, it establishes the evaluation index system and Fuzzy Analytic Hierarchy Process (FAHP) model for the development of the inland port.

Finally, through the method of combining theory with cases, this thesis analyzes the construction and development of the inland port. Through the establishment of evaluation model, taking Xi'an Inland Port as a concrete case, it combines theory with practice, and applies the Fuzzy Analytic Hierarchy Process (FAHP) of normative analysis in combination with concrete contents to provide substantial supports for the exploration of the whole work. It is hoped that the development plan in line with the construction of inland ports in China will provide a reference for the construction and development of inland ports in China. Meanwhile, we should combine with the current actual situation of China, and draw an objective conclusion through the analysis of keeping pace with the era and seeking truth from facts.

1.4.2 Research Contents

This thesis mainly expounds the current situation of the development of inland ports in China through literature review, and makes a comprehensive research on the policy model and related port integration in the development model of inland ports. Moreover, through the comprehensive evaluation model of the inland port's development, taking Xi'an inland port as a specific case, it expounds the main problems restricting the development of Xi'an inland port, and expounds the positive factors for the development of Xi'an inland port through model evaluation.

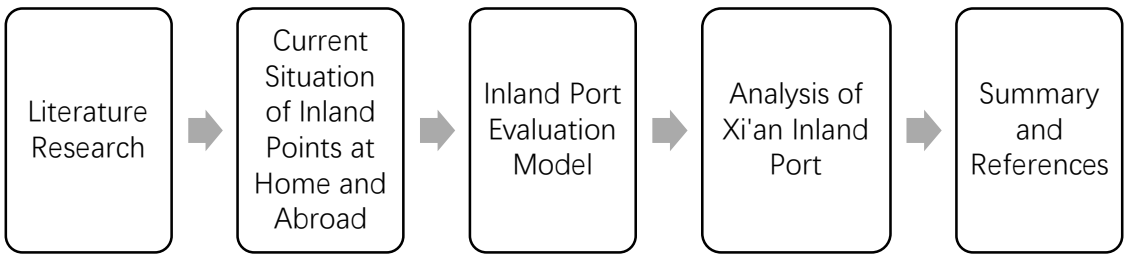

Figure 1 Research Structure

1.5 Innovation and Insufficiency of This Research

This thesis mainly conducts the research on the comprehensive evaluation model for the development of inland ports. Through the construction of the model, taking Xi'an Inland Port as a specific case, it conducts the targeted research. Among this, it puts forward many existing problems for the development of Xi'an Inland Port through the model. Moreover, according to the main factors restricting the development of Xi'an inland port, it gives the countermeasures to promote its development. Currently,

there are many researches on inland ports in China at home and abroad. However, there is scarce research on Xi'an Inland Port. In particular, providing countermeasures and suggestions for the existing problems through the establishment of the evaluation model are the innovation of this thesis.

During the research process, many factors are taken into account for the construction of inland ports. However, since the transportation problems in inland ports will be affected by many aspects, some of them are not considered in detail, such as the failure of transport lines, the failure of transport means, the natural climate, etc. Meanwhile, the scope of the case study applied in this thesis is not wide, so the results obtained in the analysis may be accidental. In this case, it is necessary to expand the scope of the research in the later research and optimize the whole result reasonably by providing more data.

2. Development Model and Related Policies of Inland Ports

2.1 Development Model of Inland Ports

2.1.1. International Transshipment Inland Port

The mode of the international transshipment hub inland port is the main mode in the current development of inland ports, which is mainly for the international container transshipment business. Moreover, it will provide warehousing logistics bonded processing and other supporting services for the consignor with the help of its own geographical advantages and related resource conditions. The international transshipment hub inland port itself owns very high quality conditions---its transportation facilities are quite developed; due to a superior position, the inland port is usually located in an important transportation hub. When the mode is developed, it often owns a variety of transportation methods, such as air, railway and highway, which can better ensure the arrival of cargoes. Under this service mode, the business focuses on the container transshipment business.

2.1.2. The Interactive Development of Inland Ports and Seaports

The interactive mode of inland ports and seaports is also a mode for the current development of inland ports. This model can achieve the complementarity of the two parties, which can also better accomplish the complementarity of the cooperation mechanism. In this way, we can achieve mutual promotion and mutual coordination under the goal of accomplishing the common demands of the two parties. By this means, many services, such as warehousing, transportation, cargo supervision, and import & export can be provided. Meanwhile, the construction of distribution centers in inland ports can better alleviate the congestion and insufficient throughput caused by the excessive density of sea and port trade. Through this model, the inland port operation function, information supervision, and other aspects can be effectively linked, and then the construction of inland port as well as the interactive development of related logistics can be better implemented.

2.1.3. The Development Model of the Bonded Port Area: Area-Port Linkage

The development model of the bonded port Area-Port linkage is a pilot project in the current development of inland ports. Through integrating related resources in the bonded area and coastal ports, we can take the advantage of relevant policy advantages

to achieve Area-Port linkage. Moreover, the functional integration can be achieved in many aspects, including resource integration, policy superposition, advantage complementary, etc. In this way, the opening inland port will gradually become a new economic situation. This development model is mainly developed by the process of linkage between bonded areas and seaports, which can better develop toward globalization and internationalized in the new era. Under this mode, it owns a very comprehensive logistics function. Meanwhile, it also owns certain bonded preferential policies, which are in important links in the global supply chain. At the same time, through effective regional and port linkage, it can also achieve its strong information processing ability.

2.1.4. Development Model of Network Systematization

In the construction and development of inland ports, the development mode of network systematization effectively integrates many contents covered in this scope, including the harbor, airport, logistics center, and other contents. In particular, it conducts advantage complementary on resources so as to achieve mutual development. Through the development mode of network systematization, the logistics in the region can be systematized. Moreover, it can realize the internal and external combination for technology and resources, taking advantage of different regional advantages. Xi'an Inland Port can form an integrated network system with Xinjiang Inland Port, Qingdao Port, and Tianjin Port so as to develop in a better way.

2.2 Development policies for Inland Ports

2.2.1. Relevant Policies for the Development of Inland Ports

Currently, inland ports have a certain policy tilt in the development, especially in recent years, the strategy of Belt and Road Initiative has been widely implemented, which also makes the construction of national central cities and Xi'an Inland Port become the first dual-code Inland Port in China. It is precisely because the inland ports can obtain a series of policy dividends. In this case, the degree of opening to the outside world of the relevant regions is also increasing, such as the Shaanxi Pilot Free Trade Zone. Due to the tilt of relevant policies, Due to the tilt of relevant policies, the whole the opening degree of Shaanxi Province as well as Xi'an City will be strengthened. Accordingly, the local government will provide policy supports for the inland port's supports. For relevant businesses, Shaanxi can reduce the cost of international logistics customs clearance, reduce the cost of enterprises, and improve the international transportation capacity. Moreover, in the competition for related resources, it also possesses a certain amount of competitiveness.

2.2.2. Port Integration Policy

Currently, the government has also attached great importance to promoting port integration. Great importance is attached to the logistics resources integration, intelligent traffic construction, and other contents in promoting the construction of intelligent city and port integration. Port integration can be accomplished by means of the tight way of government-led planning. For the time being, inland ports should actively carry out the corresponding customs reform policies, such as port integration, respond to the call actively, adjust the logistics structure, transportation mode,

competition coordination, and other levels of issues, and then seek the way to develop their own main functions through policy integration.

For the current construction and development of inland ports, port integration is also a general trend. The traditional port operation process is scattered, and there is a great competitive relationship. In 2017, the government of Liaoning Province cooperated with China Merchants Group to establish a unified management platform for Liaoning Port, which is based on Dalian Port Group and Yingkou Port Group to realize the integration of Liaoning coastal port management subjects. At the end of 2017, the assets of Dalian Port and Yingkou Port were officially transferred to Liaoning Province, opening the process of integration. This also provides a beginning for the development of port integration. In the same year, Jiangsu Province also established a port integrated operation group, integrating the internal and external resources to achieve the integrated operation. Currently, the integration trend of port resources in China is further deepened, which will constantly enhance the cross-regional cooperation between ports. Meanwhile, the cross-industry cooperation will also become a new trend. After the integration, the mutual utilization of resources will also be realized, which is of positive significance for the internal reform and the improvement of the mechanism.

2.2.3. The Change of Customs Clearance Mode

Currently, the change of customs clearance mode has also brought great opportunities for the development of inland ports. The national customs clearance integration reform can simplify the customs clearance process to a great extent. For the current customs clearance process, it is through the process of accepting declaration, examination, inspection, taxation, etc. With the implementation of the current national customs clearance integrated reform model, the new customs clearance method of "one declaration, step-by-step handling" can be adopted. This plays a positive role in promoting the construction and development of inland ports. During this process, the process and time of customs clearance can be reduced. Meanwhile, the customs clearance cargoes can be analyzed and inspected with the help of the risk prevention & control center, which can analyze whether there are risks, such as prohibition and restriction control. On July 1, 2017, the national customs clearance integration was formally implemented, which greatly reduced the limitation and cost of customs clearance, and provided a positive role in promoting the construction and development of inland ports.

2.2.4. Pilot Free Trade Zone

On August 2013, Shanghai Pilot Free Trade Zone was officially established. In March, 2014, Xi'an also established a Pilot Free Trade Zone centered on the Silk Road Economic Belt. Since the establishment of the Shanghai Pilot Free Trade Zone in 2013, many cities throughout the country have ideas on the construction of the Pilot Free Trade Zone. Meanwhile, the construction of this Pilot Free Trade Zone has also been widely concerned by the media and society. In order to better promote the development of inland ports, China hopes to build the relevant areas into core transshipment hubs.

2.3 Comparison of the Inland Port's development models

At present, there are different models for the development of inland ports. In order

to strive for resources, coastal port enterprises cooperate with inland areas to establish inland ports. These inland ports have very significant representatives. For instance, Ningbo Port cooperates with Jinhua, Yiwu, and Shaoxing, and establishes an inland port group, which can bring great resource supports for this port. Meanwhile, Tianjin Port is also a typical representative of this kind of inland port construction. It actively cooperates with inland cities, such as Shijiazhuang Inland Port, Henan Inland Port, Baotou Inland Port, etc. Through its own radiation effect, it gives full play to its own resource advantages. Yingkou Port is also through the above model to achieve its own radiation development opportunities to develop together with its surrounding cities. Moreover, it also strives for more cargo sources in Shenyang area. In the realization of inland port group construction, it also constantly broaden its own annual throughput.

In the construction of inland port, there are inland ports built in order to realize their own development. Among them, Xi'an Inland Port is more famous, which also has great influence in the construction. In particular, currently, China focuses on the development of the central and western areas in China. Accordingly, the industry is also constantly shifting to the central and western regions. In this case, as a typical inland city, Xi'an will better achieve its own development goals through the construction of the inland port in order to highlight its own status as an international city. In this way, an international port district is established with the aim to continuously stimulate the inland economy and improve its internationalization in the related construction.

Coastal ports and inland cities will also establish corresponding inland ports for mutual benefits. For instance, Changchun, Harbin, and Shenyang established inland ports with Dalian as the core in 2005, which will make the radiation range of cargo sources of Dalian Inland Port wider, and also increase the cargo source control and logistics transportation capacity of the three inland ports. It has also rapidly realized the integration pace of Northeast China with the world economy. In addition, Tianjin Port establish an inland port in Shijiazhuang, which is also in line with the goal of mutual benefits so as to better radiate its source services and other contents to the mainland. Moreover, through the use of advanced management technology, the complementary of resource strengths can be achieved.

Table 1 Comparison of Development Models of Inland Ports

Types of Inland Port	Striving for Port Resources	Achieving Expansion	Mutual Benefit of Ports
Core Port	Ningbo Port	Xi'an Inland Port	Dalian Inland Port
Peripheral Radiation	Jinhua-Yiwu-Shaoxing Port	Adjacent Cities	Changchun, Harbin

3. Comprehensive Evaluation Model for the Development of the Inland Port

3.1 Overview on the Evaluation of the Inland Port's Development System

For the development of the current inland port, it is necessary to establish an effective development system evaluation. Only in this way can we better point out the way for its future development. In particular, many inland cities should combine local economic conditions, policies, actual conditions, and development demands to better align with the world, which requires to conduct comprehensive evaluation on them. In

establishing the development evaluation system on inland ports, we need to observe the following principles. Firstly, it is necessary to ensure the comprehensiveness of the evaluation system. We need to carry out more comprehensive analysis on inland ports, including internal evaluation indicators as well as external evaluation indicators. Meanwhile, we need to combine the economic policy development of the area where the inland port is located as well as its surrounding area. Secondly, we need to ensure the scientific principle to establish a set of more scientific and standardized theory to constrain it. Meanwhile, in the establishment of the evaluation system, there are also real indicators reflecting the inland port. Through this principle, it can better present the content of the hierarchical structure layout index on inland ports. Finally, we need to ensure the principle of simplicity and feasibility. The corresponding evaluation system should be scientific and reasonable. Meanwhile, it should be well-structured to measure the development ability of the inland port accurately and comprehensively. In this system, we can analyze the system elements, and determine the evaluation index system through a clear and systematic objective. On the basis of it, we can determine the ultimate evaluation method and provide a certain analysis result for the development level and development construction of the inland port by combining the content of the single comprehensive evaluation.

3.2 Establishment of the Index System for the Development System of Inland Ports

When establishing the index system for the development system of inland ports, we should first ensure the basic principles of the evaluation index. Among these, it is necessary to establish it through the principles of science, comprehensiveness, independence, and feasibility. In the index system, we should ensure that the key points are highlighted. Meanwhile, the results obtained through analysis also need to be representative. In establishing the index system of the internal development system, we need to analyze its hierarchical structure. Among these, we can combine the target layer, the criterion layer, and the index layer to conduct hierarchical establishment. For indexes, we can analyze many contents, including the scale of the inland port area, storage capacity, loading & unloading capacity, foreign trade level, industrial structure, annual throughput, service level, etc. Moreover, on the basis of it, we can select the suitable evaluation method. The following table is the index system for the development of inland ports. The selected contents are all closely related to the logistics ability of inland ports. Meanwhile, those are also closely related to the development and construction of the region.

Table 2 The Index System for the Development of Inland Ports.

The Index System of the Development Level for Inland	Input Index	Storage Area (Square Kilometers)
		Average Vehicle/ Container Shift Density
		Number of Large Loading & Unloading Machinery (Set)
		The Density of Highway Network in the Area (Km/ Square Km).
		Density of Railway Network in the Area (Km / Square Km)
		Density of Water Network in the Area (km / Square Km)
	Output Index	GDP of Direct Hinterland (100 Million Yuan)
		Total Import & Export Trade (100 Million Yuan)

Ports		Container Throughput (Ten Thousand TEU)
		Cargo Throughput (100 Million Tons)
		Vehicle Cargo Handling Capacity (10,000 Tons)
		Added Value of Logistics Industry (100 million Yuan)

3.3 Establishment of FAHP Model for the Development level of Inland Ports

For the establishment of the current FAHP model on the development level of inland ports, it can be analyzed by the establishment of the effective evaluation index system. Through the above methods, many qualitative indexes can be quantitatively processed, and the related indexes can be transformed into quantitative evaluation models. Subsequently, the relevant evaluation can be carried out by scientific and reasonable methods. Meanwhile, the suitable model for the development of inland ports can also be explored. The reason why the fuzzy hierarchy method is selected in this thesis is that it is very difficult to apply AHP to test whether the judgment matrix is consistent or not. Moreover, the standard $CR < 0.1$ applied to test whether the judgment matrix has consistency is short of scientific basis; there is a significant difference between the consistency of judgment matrix and the consistency of human thinking. The Fuzzy Analytic Hierarchy Process (FAHP), formed through combing the advantages of fuzzy method and the Analytic Hierarchy Process (AHP), will be able to solve the inconsistency of thinking caused by many hierarchy evaluation indexes (such as more than four).

4. Case-study on Xi'an Inland Port.

4.1 Development of Xi'an Inland Port

Xi'an Inland Port refers to Xi'an International Trade & Logistics Park, which was set up in 2008. Its main construction goal is to set up the first inland international port, which is not adjacent to the river or sea in the inland. In 2010, Xi'an Inland Port officially opens railway container center station. In 2013, it opened the first international freight shift. In 2015, China's construction of "Belt and Road Initiative" has also clearly indicated that it is necessary to support the construction of the first inland port.

Table 3 Analysis on the Development of Xi'an Inland Port in Recent Years

Analysis on the Development of Xi'an Inland Port in Recent Years	Strengths	advantageous location; rich resources; economic leadership; developed transportation
	weaknesses	Low degree of information; shortage of talents; lack of overall planning; lack of hardware facilities
	Opportunities	The trend of developing export-oriented economy and port modernization; policy tendency and government supports; strategic measures for effective use of coastal ports to expand inland hinterland
	Threats	The fierce competition between inland ports; the emplacement of international logistics enterprises and business sharing

Xi'an Inland Port is located in the northeast of Shaanxi Province, mainly relying on the main body of Xi'an International Port Area to operate. It is established on the basis

of the Comprehensive Protection Area, Highway Port, and the railway container transfer station project, forming cooperative relations with Tianjin port, Lianyungang port, Qingdao port, Dalian port, Alashankou Port (Xinjiang Autonomous Region), and Khorgas Port (Xinjiang Autonomous Region) to extend the service function of ports to the international port area.

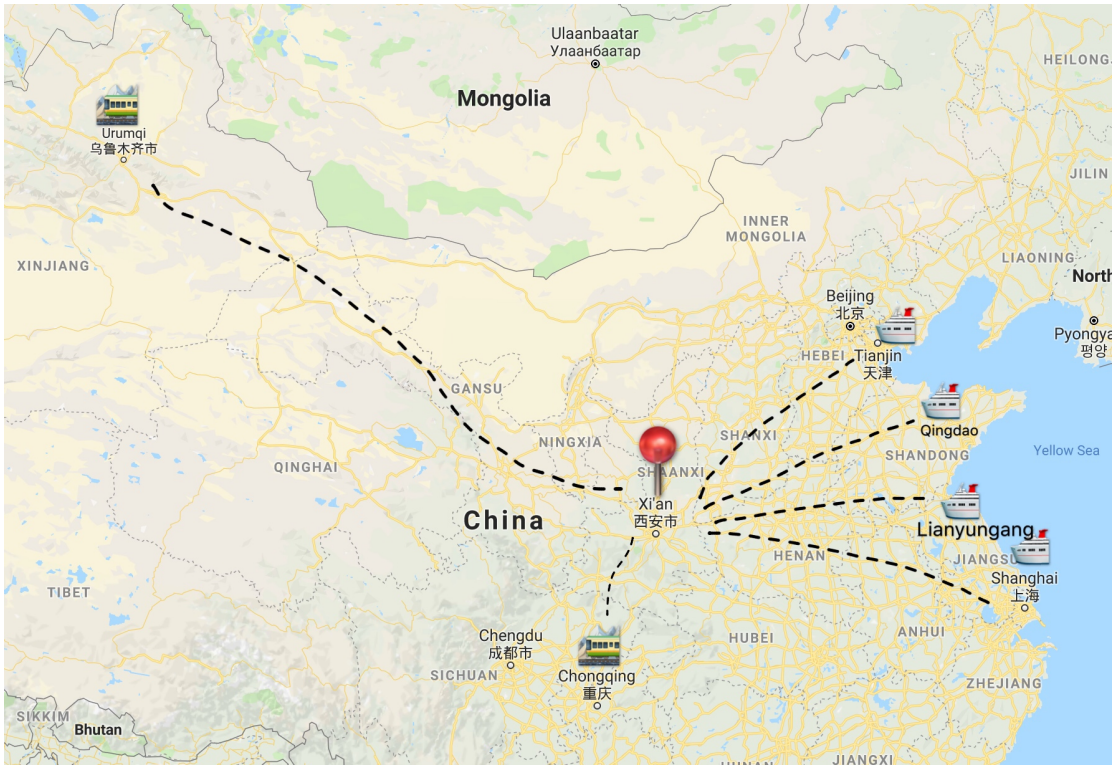

Figure 2 The Map of Xi'an Inland Port

4.2 Existing problems in the development of Xi'an Inland Port

Currently, there will be many problems in the development of Xi'an Inland Port. On the one hand, it owns many advantages in the current development as an important support of China's national strategy. On the other hand, it will also face many challenges in its construction. First of all, the logistics industry foundation of Shaanxi Province is relatively weak, which also lacks motivation support in the development of its modern service industry and modern industry. Therefore, the development level of related industries is relatively backward. Meanwhile, its policy support is also relatively weak. In comparison with many surrounding provinces and cities, there will be serious homogenization in the process of competition. In this case, Xi'an Inland Port does not have obvious advantages in its development. In the process of inland port construction, it need service supports in many levels, including the centralized land security, institutional mechanism, policy, funds, etc. In the process of China's developing "Belt and Road Initiative", the construction of Xi'an Inland Port has also been given great attention. To solve the existing problems in the development of Xi'an Inland Port, the solution strategies are as follows: making efforts to develop the export-oriented economy; conducting overall planning for Xi'an Inland Port; adjusting its internal industrial structure. Meanwhile, it can also better promote Xi'an in the current role of an international transit hub port.

4.2.1. Lack of Efficient Utilization of Resources

Currently, Xi'an Inland Port still has many problems in the process of construction, which will also restrict the development of Xi'an Inland Port. At present, many of the resources of the inland port of Xi'an Inland Port have been put into use. However, its value is not fully utilized. In particular, for the logistics of Xi'an Inland Port, it is far from the development requirements. For the time being, if the logistics and other resources of Xi'an Inland Port are not constructed and adjusted urgently, it will not be able to better find a suitable development model for itself.

4.2.2. Incomplete Logistics Transportation Channel of the New Eurasian Continental Bridge

Currently, in the process of construction of Xi'an Inland Port, the logistics and transportation channels of the New Eurasian Continental Bridge are still not perfect. There will still be many problems so that the relevant resources cannot give full play to their values. First of all, due to the lack of logistics trading platform, many businesses cannot be carried out at all. Meanwhile, the international transport mechanism cannot be better guaranteed due to the lack of the platform. There will also be many problems in logistics and transportation, such as the lack of smooth lines. Moreover, there is still a long way to go from the target construction of the New Eurasian Continental Bridge. The construction of the New Eurasian Continental Bridge is mainly to promote the development of inland ports. To achieve this target, it needs to communicate with other trading countries. If there is no corresponding logistics trading platform, then it will bring great obstacles for the construction of Xi'an Inland Port. It is necessary to make it clear that the New Eurasian Continental Bridge is the golden channel for the transportation of cargoes. If its channel construction and resource utilization are not perfect, it will restrict the development and construction of the New Eurasian Continental Bridge.

4.2.3. Small Radiation Range

For the construction of the inland port, it is mainly to strengthen its radiation range and give full play to the driving effect of the inland port with the aim to promote the rapid development of the surrounding logistics as well as the related economy. However, from the current construction situation of Xi'an Inland Port, there will still be many problems as follows: it does not give full play to its radiation role; it does not promote the development of the surrounding areas through its own construction. Under different intermodal transportation modes, the radiation range of the cargo source is also different. However, there is still a certain gap between it and the target construction.

4.3 Factors Affecting the Development of Xi'an Inland Port

4.3.1 Economic Conditions of the inland City

The economic condition of Xi'an will have a great impact on its development. For instance, its geographical environment will affect the construction of the inland port as well as many related business developments. There is a great relationship between the economic level and foreign trade demand in the inland city, which will also affect the development level of the inland port.

4.3.2 Policy resources

The policy resources refer to how the government attaches importance to the

construction of inland ports. For the construction, the government will provide many political supports, such as investing manpower and material resources to realize the joint economic ties along the sea port and the inland region. The degree of policy openness as well as the level of economic development will have a great impact on the inland port's development orientation, height, and target.

4.3.3 Infrastructure Conditions

Infrastructure conditions will also affect the development of inland ports in Xi'an Inland Port. Among them, Xi'an's highway, railway facilities, power equipment, power supply, and water supply equipment will become a solid guarantee for the inland port's construction, including the information center degree, warehouse area, loading & unloading machinery quantity, and yard area.

4.3.4 Construction Conditions for Traffic Resources

The construction of transportation facilities will influence the logistics systems in the inland port. Many contents, including the route coverage, inland urban railway network density, inland urban water network density, inland urban highway network density, will all affect Xi'an Inland Port.

4.3.5 The Level of Integrated Management Services

For the development of the inland port, the level of integrated services is an important evaluation standard, including customs, animal & plant inspection and quarantine, commodity inspection, shipping agency, freight forwarders, trading, hospitals, banks, and entertainment services. These issues have a very important impact on the investment environment and development of the inland port. Any customer will look forward to high quality service. With the gradual development of inland ports, the level of the integrated services has gradually become the development core of the inland port.

4.4 Applying the Model to Evaluate Xi'an Inland Port

4.4.1. Index System Setting

For the construction and development of Xi'an Inland Port, it is also a very complicated work to determine its development model because the construction of Xi'an Inland Port will involve a lot of content. Therefore, it is necessary to evaluate it comprehensively and scientifically when it comes to the selection of its development mode. In this way, it is necessary to establish a clear index system for the development level of Xi'an Inland Port, on the basis of which the fuzzy hierarchical evaluation is carried out. In the selection of indicators as well as the construction of relevant index system, it is necessary to follow the principles of systematicness, evaluation, and practicability. Moreover, it needs to combine the current development situation of Xi'an Inland Port inland port to establish a clear index system.

In the current construction of the inland port, it has great links with all levels of society. Meanwhile, during the construction process, the logistics is very significant sources. The construction of logistics will also be carried out in the light of the current situation of China's transportation system, which is also carried out on the basis of the national economic foundation.

Therefore, Xi'an Inland Port has a certain sociality in the construction. Meanwhile, the index evaluation should also be based on the geographical location, logistics level,

service level, and relevant facilities conditions of Xi'an Inland Port. In this way, it is convenient to select the inland port scientifically and efficiently in the current construction, which is closely related to all levels of society. Meanwhile, during its construction, the logistics needs to be in line with the development situation of Xi'an Inland Port, and then provides kinetic energy for its construction and development. The evaluation system of development index is constructed through the factors that affect the development of the inland port, which is expounded in chapter 4.3.

Table 4 The Evaluation System on Development Indexes of Xi'an Inland Port

Influencing Factors	Specific Influencing Factors
Economic Conditions of the Inland City	GDP of the Inland City
	Total Volume of Import & Export Trade
	Container Throughput
	Turnover of Freight Traffic
	Quantity of Shipments
Policy Resources	Policy Objectives
	Policy Height
	Policy Effectiveness
	Policy Scope
	Trade Environment
Infrastructure Conditions	Information Center Degree
	Warehouse Area
	Number of Loading & Unloading Machinery
	Yard Area
Construction Conditions of Traffic Resources	Airline Coverage
	Density of Railway Network in the Inland City
	Density of Water Network in the Inland City
	Density of Highway Network in the Inland City
Integrated Management Service Level	Number of EDI System Users
	Proportion of EDI System Networking
	Logistics Cost of the Inland Port
	Construction of Logistics Information platform
	Average Import & Export Customs Clearance Efficiency
	Average Unloading Efficiency

4.4.2. Selection of the Development Model

When analyzing the development mode and the current situation of Xi'an Inland Port, we can combine the above list to analyze its economic conditions, political resources, infrastructure, geographical environment, and the comprehensive service level, and take it as the basic factor to provide the corresponding evaluation index for the development model of Xi'an Inland Port. This thesis adopts the Analytic Hierarchy Process (AHP) model to establish the relevant hierarchical model for Xi'an

Inland Port and provide analytical support for its development.

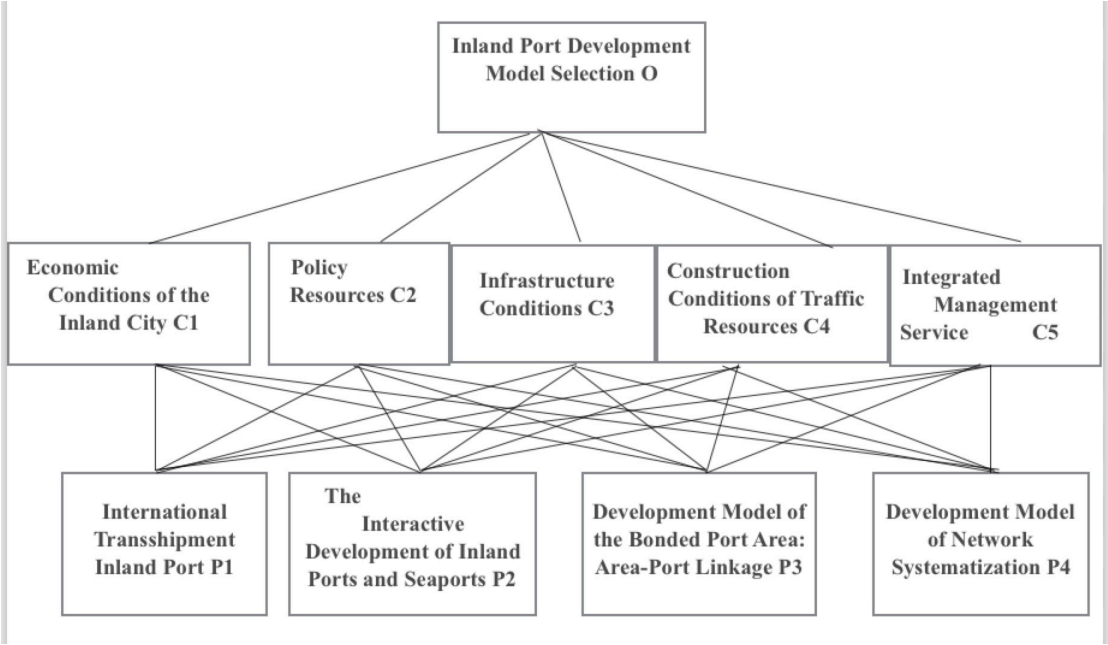

Figure 3 The Selected relationship of the Development Model

4.4.3. FAHP Analysis on the Development Mode of Xi'an Inland Port

In the application of Fuzzy Analytic Hierarchy Process (FAHP), questionnaires were selected to research the selection of the development model. Among them, Table 5 and Table 10 were questionnaire contents. A total of 30 questionnaires were distributed; 25 copies were effectively recovered, and the recovery rate of the questionnaires was 83%. There were total 25 interviewees, who mainly came from ports, shipping companies, logistics companies, and university teachers. Among those, port works accounted for 40%; university teachers accounted for 20%; shipping companies and logistics companies accounted for 16%; several working positions are related to the development of the inland port. The enterprise management personnel and the teachers accounted for more than 24%; the proportion of the technical personnel, the government personnel, and the agent were very close; among 25 employees, there were 52% employees, whose working ages were more than 52%. Our data can be more comprehensive and accurate through diverse interviewees as well as the professional perspective from multi-year experience.

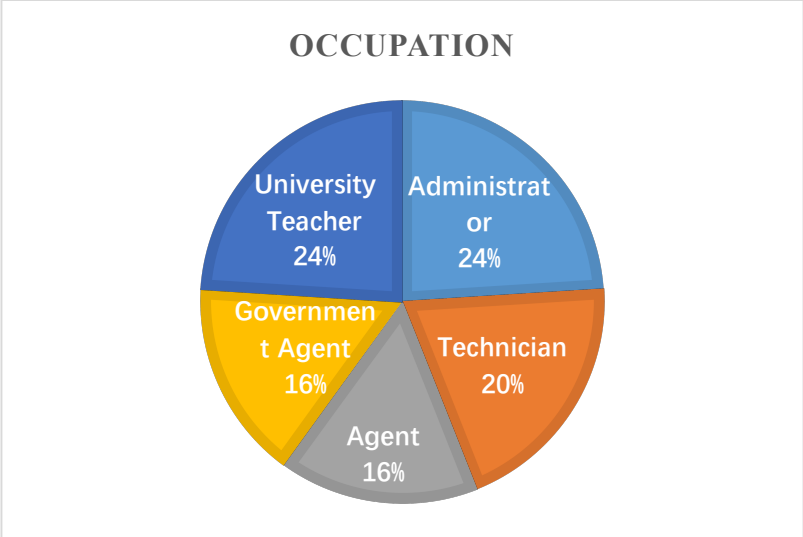

Figure4 Occupational Distribution Diagram of Interviewees

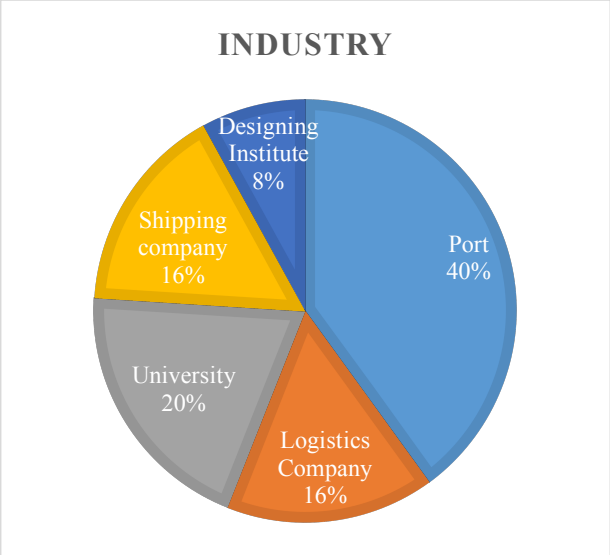

Figure5 Industry Distribution Diagram of interviewees

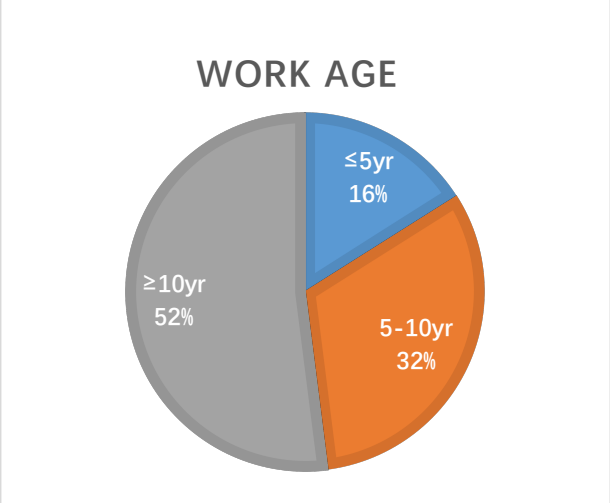

Figure6 Distribution Diagram of Interviewees' Working Age

Combining with the questionnaire scoring table, we judged the importance of each index. On the basis of it, a matrix was formed on this basis of it. The following table was about the scoring table in the construction of Xi'an Inland Port. We judged different indicators to affect the judgment of the following secondary indicators. Subsequently, according the score table below, we determined scores, judged the matrix, and calculated according to the obtained scores.

Table 5 Judgment Table on the Importance of First-level Indicators

	Economic Conditions of the Inland City	Policy Resources	Infrastructure Conditions	Construction Conditions of Traffic Resources	Integrated Management Service
Economic Conditions of the Inland City	0.5				
Policy Resources		0.5			
Infrastructure Conditions			0.5		
Construction Conditions of Traffic Resources				0.5	
Integrated Management Service					0.5

Table 6 Judgment Table on the Importance of Secondary Indicators under the Economic Situation of Inland Cities

Economic Conditions of the Inland City	International transshipment inland port	Interactive Development of Inland Ports and Seaports	Development model of the bonded port Area-Port linkage	Network systematization
International transshipment inland port	0.5			
Interactive		0.5		

Development of Inland Ports and Seaports				
Development model of the bonded port Area-Port linkage			0.5	
Network systematization				0.5

Table 7 Judgment Table on the Importance of Secondary Indicators under the Policy Resources

Policy Resources	International transshipment inland port	Interactive Development of Inland Ports and Seaports	Development model of the bonded port Area-Port linkage	Network systematization
International transshipment inland port	0.5			
Interactive Development of Inland Ports and Seaports		0.5		
Development model of the bonded port Area-Port linkage			0.5	
Network systematization				0.5

Table 8 Judgment Table on the Importance of Secondary Indicators under the Infrastructure Conditions

Infrastructure Conditions	International transshipment inland port	Interactive Development of inland ports and seaports	Development model of the bonded port Area-Port linkage	Network systematization
International	0.5			

transshipment inland port				
Interactive Development of inland ports and seaports		0.5		
Development model of the bonded port Area-Port linkage			0.5	
Network systematization				0.5

Table 9 Judgment Table on the Importance of Secondary Indicators under the Construction Conditions of Traffic Resources

Construction Conditions of Traffic Resources	International transshipment inland port	Interactive Development of inland ports and seaports	Development model of the bonded port Area-Port linkage	Network systematization
International transshipment inland port	0.5			
Interactive Development of inland ports and seaports		0.5		
Development model of the bonded port Area-Port linkage			0.5	
Network systematization				0.5

Table 10 Judgment Table on the Importance of Secondary Indicators under the Integrated Management Service

Integrated management level	International transshipment inland	Interactive Development of inland ports	Development model of the bonded port	Network systematization

	port	and seaports	Area-Port linkage	
International transshipment inland port	0.5			
Interactive Development of inland ports and seaports		0.5		
Development model of the bonded port Area-Port linkage			0.5	
Network systematization				0.5

4.4.3.1 Establishment of Fuzzy Priority Relation Matrix and Calculation of Weights

(1) An evaluation object index set was established. A first-level indicator set is as follows: $B=\{B_1,\ B_2,\cdots B_n\}$; the secondary indicator set is as follows: $C=\{C_1,\ C_2,\cdots C_n\}$.

(2) The fuzzy priority relation matrix was established. Applying the scaling principle of FAHP method (See Table 4 -3), we established the fuzzy priority relation matrix $R=(r_{ij})_{m\times n}$ according to the relative importance of each element in each layer relative to a certain element in the upper layer. Details are as follows:

$$R=\begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{nn} \end{bmatrix}$$. R is called the fuzzy priority relation matrix.

Table 4-3: The Scaling Principle of FAHP

Usually, a_{ij} takes 0.5, 0.6, 0.7, 0.8, 0.9 or 0.1, 0.2, 0.3, 0.4, where 0.1～0.9 is the standard value. We suppose the column element is C1, and the column element is C2. The details are as follows:

Table 4-3: Scale Principles of the FAHP Method

Scale Value	Implication
0.5	C1 compared with C2, they have equal importance
0.6	C1 compared with C2, C1 is moderate importance
0.7	C1 compared with C2, C1 is obviously important
0.8	C1 compared with C2, C1 is strongly important
0.9	C1 compared with C2, C1 is extremely important
0.1、0.2、0.3、0.4	It indicates the importance degree that C1 is not as important as C2 in the corresponding sense.

4.4.3.2 Hierarchical Single Ranking and Consistency Verification

We performed the hierarchical single ranking, and applied fuzzy priority relation matrix to estimate the important order of each level of factors (i.e. weight). The following formula was utilized: $W_i = \frac{1}{n} - \frac{1}{2a} + \frac{1}{na} \bullet \sum_{k=1}^{n} r_{ik}$ (Here, n is the exponent number of matrix R). $a = \frac{(n-1)}{2}$.

4.4.3.3 Establishment of the Fuzzy Priority Relation Matrix

Standard	C1	C2	C3	C4	C5
C1	0.5	0.6	0.7	0.6	0.4
C2	0.4	0.5	0.7	0.6	0.3
C3	0.3	0.3	0.5	0.4	0.2
C4	0.4	0.4	0.6	0.5	0.3
C5	0.6	0.6	0.5	0.7	0.6

(1) The fuzzy priority relation matrix was established as follows:

$$R=\begin{bmatrix}0.5 & 0.6 & 0.7 & 0.6 & 0.4\\ 0.4 & 0.5 & 0.7 & 0.6 & 0.3\\ 0.3 & 0.3 & 0.5 & 0.4 & 0.2\\ 0.4 & 0.4 & 0.6 & 0.5 & 0.3\\ 0.6 & 0.6 & 0.5 & 0.7 & 0.6\end{bmatrix}$$

The fuzzy consistent judgment matrix is calculated as follows:

$$P=\begin{bmatrix}0.5 & 0.53 & 0.61 & 0.56 & 0.48\\ 0.47 & 0.5 & 0.58 & 0.53 & 0.45\\ 0.39 & 0.42 & 0.5 & 0.45 & 0.37\\ 0.44 & 0.47 & 0.55 & 0.5 & 0.42\\ 0.52 & 0.55 & 0.63 & 0.58 & 0.5\end{bmatrix}$$

The weight set of the first-level index layer relative to the total goal was calculated and obtained.

Standard	Weight
C1	0.218
C2	0.203
C3	0.163
C4	0.188
C5	0.228

Similarly, the weight of the scenario layer was shown in the following table:

Table 11 C1 Fuzzy Priority Relation Matrix and Weight

C1	P1	P2	P3	P4	Weight	Consistency check
P1	0.5	0.8	0.3	0.5	0.2646	I=0.0085,
P2	0.2	0.5	0.5	0.4	0.2229	Pass the
P3	0.4	0.6	0.5	0.4	0.2479	consistency
P4	**0.4**	**0.6**	**0.6**	**0.5**	**0.2646**	check

Table 12 C2 Fuzzy Priority Relation Matrix and Weight

C2	P1	P2	P3	P4	Weight	Consistency check
P1	0.5	0.4	0.4	0.6	0.2458	I=0.0128,
P2	0.4	0.5	0.4	0.6	0.2458	Pass the

P3	0.6	0.6	0.5	0.7	0.2875	consistency
P4	0.4	0.4	0.3	0.5	0.2208	check

Table 13 C3 Fuzzy Priority Relation Matrix and Weight

C3	P1	P2	P3	P4	Weight	Consistency check
P1	0.5	0.7	0.6	0.4	0.2104	I=0.0447,
P2	03	0.5	0.4	0.3	0.3771	Pass the
P3	0.4	0.6	0.5	0.3	0.1771	consistency
P4	0.6	0.7	0.7	0.5	0.2354	check

Table 14 C4 Fuzzy Priority Relation Matrix and Weight

C4	P1	P2	P3	P4	Weight	Consistency check
P1	0.5	0.4	0.6	0.6	0.2583	I=0.0135,
P2	0.6	0.5	0.6	0.7	0.2833	Pass the
P3	0.4	0.4	0.5	0.6	0.2417	consistency
P4	0.4	0.3	0.4	0.5	0.2167	check

Table 15 C5 Fuzzy Priority Relation Matrix and Weight

C5	P1	P2	P3	P4	Weight	Consistency check
P1	0.5	0.7	0.6	0.6	0.2833	I=0.0135,
P2	0.3	0.5	0.4	0.4	0.2167	Pass the
P3	0.4	0.6	0.5	0.6	0.2583	consistency
P4	0.4	0.6	0.4	0.5	0.2417	check

According to the above contents, we could summarize the fuzzy complementary judgment matrix into the following judgment matrix:

Table 16 Judgment Matrix

	C1	C2	C3	C4	C5
P1	0.2646	0.2458	0.2104	0.2583	0.2833
P2	0.2229	0.2458	0.3771	0.2833	0.2167
P3	0.2479	0.2875	0.1771	0.2417	0.2583
P4	0.2646	0.2208	0.2354	0.2167	0.2417

The total score of each scheme layer was obtained by the weighted sum of the scores from the scheme layer by applying the index weight. Then, we obtained the following contents:

	C1	C2	C3	C4	C5	Total

	0.218	0.203	0.163	0.188	0.228	Score
P1	0.2646	0.2458	0.2104	0.2583	0.2833	0.255
P2	0.2229	0.2458	0.3771	0.2833	0.2167	0.2626
P3	0.2479	0.2875	0.1771	0.2417	0.2583	0.2456
P4	0.2646	0.2208	0.2354	0.2167	0.2417	0.2367

According to the above calculations, we sorted the hierarchical results. Details are as follows:

$$w= (0.255,0.2626,0.2456,0.2367)$$

The scheme was selected for comparative analysis on the basic theory of the FAHP analysis model, and the second of the above figures was the maximum, indicating that it was the optimal selection model. Namely, for the construction and development of Xi'an inland port, it is necessary to be selected to become the hub inland port in the world. Only in this way can we enable it to develop more kinetic energy.

4.5 Suggestions for Promoting the development of Xi'an Inland Port

This thesis mainly researches on the current situation of the intersection construction in Xi'an through the Fuzzy Analytic Hierarchy Process (FAHP), and selects the optimal development scheme according to its current development mode. Through the analysis, it is found that for the current development of Xi'an Inland Port, the positive factor to promote its development is to transform it into an international transshipment inland port. Xi'an is located in the hinterland, and its urban economic conditions policy and environment have some defects. Therefore, it is necessary to combine the geographical environment infrastructure conditions to improve its comprehensive service level. Moreover, on the basis of it, we need to construct an evaluation index system in line with its development. Through the analysis of Fuzzy Analytic Hierarchy Process (FAHP), it can be concluded that the development model of Xi'an Inland Port owns the greatest potential for the transshipment inland port in the world at present.

4.5.1 Making Full Use of Strengths of Xi'an Transportation Hub

According to the above quantitative analysis, it can be made clear that the development of Xi'an Inland Port should be in the direction of the international transition hub inland port. Moreover, Xi'an also has great strengths, which we can utilize to achieve development. Xi'an is not only the geometric center of China, but also the core part of the economic belt between the east and the west of China. In addition, it is the largest city in the Chinese section of the new Asia-Europe continent. Meanwhile, Xi'an can accomplish the development of the hub with the help the developed transportation system of Xi'an. Utilizing the Huoerguosi-Lianyungang Expressway, Beijing-Kunming Expressway, Baotou-Maoming Expressway, we can conduct the effective resource docking with Northeast, East China, Central China, South China, and other places. Meanwhile, the railway container central station can be established so as to provide the basis for the development of its logistics system.

4.5.2. Improving Policy Supports

For the time being, Xi'an Inland Port should also strive for policy supports. As early as 2009, the State Council provided policy supports for the land and funds of Xi'an Inland Port according to the adjustment and revitalization of logistics technology. In 2013, Shaanxi also put forward the construction scheme of circulation mechanism. Currently, we should strive for more national policy supports, in which we can obtain special authority, such as offshore financial business; we can develop potentials of tax relief and logistics system construction through policy as a guarantee. Meanwhile, we can better provide space demand for the inland port construction in combination with the land development policy,

4.5.3. Perfecting the Layout of the Inland Port of the International Transshipment Inland Port ASAP

Xi'an Inland Port should perfect its layout of the transitional inland port in the international hub as soon as possible according to its future development direction. In combination with Belt and Road Initiative construction, we should make it become a transportation hub in the current 'Silk Road Economic Belt'; we should give full play to the function of container transit, and upgrade the system comprehensively from many aspects, including the management and operation of the transshipment inland port, the establishment of the platform, the industrial agglomeration, etc.

4.5.4. Perfecting the Construction of the Information System

Xi'an Inland Port should establish the information system to serve foreign trade logistics. Among them, we should focus on the development of modern service industry, and increase import and export trade on the basis of it; we should enrich the function of inland port constantly so as to make it maintain its core competitiveness in the increasingly fierce market competition environment. Meanwhile, we should constantly improve the operational efficiency of the inland port as well as its coordination ability of internal institutions so as to better radiate the surrounding areas and achieve progress.

5. Conclusion and Extension

5.1 Main Conclusions

This thesis mainly analyzes the current development model of inland ports. In combination with Fuzzy Analytic Hierarchy Process (FAHP), it is to conduct the model establishment on relative evaluation index for the development level of inland ports. On the basis of this, it is to provide scientific theoretical supports for the construction and development of inland ports. Meanwhile, this thesis takes Xi'an Inland Port as an example to analyze, in which the Fuzzy Analytic Hierarchy Process (FAHP) is applied to conduct the modeling analysis on its development indexes. In addition, the conclusions are drawn through the modeling calculation as follows:

1. There are many hindrance factors in the construction of Xi'an Inland Port. The following aspects will influence the development of Xi'an Inland Port: the resources are not utilized effectively; the logistics transportation channel of New Asia-Europe Continental Bridge is not perfect; the radiation range is small.

2. For the construction of inland port in Xi'an Inland Port, the inland city's economic conditions, policy resources, infrastructure conditions, traffic resources construction conditions, and the comprehensive management service level are very important

contents, which are also the most important contents to be considered in conducting modeling establishment.

3. According to the geographical position of Xi'an Inland Port as well as the route map of New Asia-Europe Bridge, it is found that the large inland ports along the route are Xi'an Inland Port, Lanzhou Inland Port, and Zhengzhou Inland Port. However, the formation of the international transshipment inland port needs to have many basic premises, including the comprehensive bonded zone, large transportation hub, bonded logistics center, strengths of certain professionals and so on. Lanzhou Inland Port possesses only one of the four basic premises; Compared with Xi'an Inland Port, Zhengzhou Inland Port cover the first three premises. However, its talent advantage is still relatively weak; Xi'an Inland Port can meet the four basic premises, so Xi'an Inland Port should develop in the direction of international transshipment hub inland port, which is also a potential development direction. There are many positive factors in the construction and development of Xi'an Inland Port. Through the expounding of this thesis, we can explore the most relevant factors related to the development of Xi'an Inland Port. On the basis of it, we can provide kinetic energy for the competition and mutual resource supplement of Xi'an Inland Port.

5.2 Possible Research Directions

For Xi'an Inland Port, there are still some insufficiencies in this thesis. The analysis model is too single. Meanwhile, the construction structure of Xi'an Inland Port is more complex, among which there are many resources and influencing factors. In the future research on the construction of Xi'an Inland Port, we can research and explore other influencing factors, and open up a kind of inland port construction mode in line with the actual needs of Xi'an Inland Port. On the basis of it, we can better practice the sharing of resources with the aim to maintain the core competitiveness of Xi'an Inland Port.

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Appendix-Questionnaire on the Weight of the Development Evaluation Index System of Xi'an Inland Port

Dear expert,

Thank you for taking your valuable time to fill out this form!

The purpose of this research is to research the weight of each index from the development evaluation index system of Xi'an Inland Port so as to evaluate the development level of Xi'an Inland Port objectively and directly. Now, we want to consult your opinion on the importance of each index. Please determine its relative importance through the comparison of the pairwise indexes according to your own work experience. After the pairwise comparison, please give the corresponding score in the table (please express it in the way of "score"). The score is based on the 9-level scale method. The values of 0.9, 0.8, 0.7, 0.6 and 0.5 are used to compare the row elements to the column elements, which are "absolutely important", "very important", "more important", "slightly more important", and "equally important" respectively; 0.4, 0.3, 0.2, and 0.1 indicates that the importance degrees of the row elements in the corresponding sense is less than that of the column elements. Thank you very much for your support and cooperation.

Table 1-1 Judgment Table on the Importance of First-level Indicators

	Economic Conditions of the Inland City	Policy Resources	Infrastructure Conditions	Construction Conditions of Traffic Resources	Integrated Management Service
Economic Conditions of the Inland City	0.5				
Policy Resources	×	0.5			
Infrastructure Conditions	×	×	0.5		
Construction Conditions of Traffic Resources	×	×	×	0.5	
Integrated Management Service	×	×	×	×	0.5

Index Notes:

The economic situation of the inland city includes GDP of the inland city, the total

import & export trade, container throughput, cargo turnover, and freight volume.
The policy resources include Policy Objectives, Policy Height, Policy Effectiveness, Policy Scope and Trade Environment
The infrastructure conditions include information center degree, warehouse area, number of loading & unloading machinery and yard area

The construction conditions of traffic resources include airline coverage, density of railway network in the inland city, density of water, network in the inland city and density of highway network in the inland city

The integrated management service includes number of EDI system users, proportion of EDI system networking, logistics cost of the inland port, construction of logistics information platform, average import & export customs clearance efficiency and average unloading efficiency

Table 2-1 Judgment Table on the Importance of Secondary Indicators under the Economic Situation of Inland Cities

Economic Conditions of the Inland City	International transformation hub	Interactive Development of inland ports and seaports	Development model of the bonded port Area-Port linkage	Network systematization
International transformation hub	0.5			
Interactive Development of inland ports and seaports	×	0.5		
Development model of the bonded port Area-Port linkage	×	×	0.5	
Network systematization	×	×	×	0.5

Table 2-2 Judgment Table on the Importance of Secondary Indicators under the Policy Resources

Policy Resources	International transformation	Interactive Development	Development model of the	Network systematizatio

	hub	of inland ports and seaports	bonded port Area-Port linkage	n
International transformation hub	0.5			
Interactive Development of inland ports and seaports	×	0.5		
Development model of the bonded port Area-Port linkage	×	×	0.5	
Network systematizatio n	×	×	×	0.5

Table 2-3 Judgment Table on the Importance of Secondary Indicators under the Infrastructure Conditions

Infrastructure Conditions	International transformation hub	Interactive Development of inland ports and seaports	Development model of the bonded port Area-Port linkage	Network systematizatio n
International transformatio n hub	0.5			
Interactive Development of inland ports and seaports	×	0.5		
Development model of the bonded port Area-Port linkage	×	×	0.5	

Network systematizati on	×	×	×	0.5

Table 2-4 Judgment Table on the Importance of Secondary Indicators under the Construction Conditions of Traffic Resources

Construction Conditions of Traffic Resources	International transformation hub	Interactive Development of inland ports and seaports	Development model of the bonded port Area-Port linkage	Network systematizatio n
International transformatio n hub	0.5			
Interactive Development of inland ports and seaports	×	0.5		
Development model of the bonded port Area-Port linkage	×	×	0.5	
Network systematizati on	×	×	×	0.5

Table 2-5 Judgment Table on the Importance of Secondary Indicators under the Integrated Management Service

Integrated management level	International transformation hub	Interactive Development of inland ports and seaports	Development model of the bonded port Area-Port linkage	Network systematizatio n
International transformatio n hub	0.5			
Interactive Development	×	0.5		

of inland ports and seaports				
Development model of the bonded port Area-Port linkage	×	×	0.5	
Network systematization	×	×	×	0.5

Index Notes:
International transshipment inland port: This mode is the main mode in the current development of inland ports, it will provide warehousing logistics bonded processing and other supporting services for the consignor with the help of its own geographical advantages and related resource conditions.

The interactive mode of inland ports and seaports: This model can achieve the complementarity of the two parties, which can also better accomplish the complementarity of the cooperation mechanism.

The development model of the bonded port Area-Port linkage: Through integrating related resources in the bonded area and coastal ports, we can take the advantage of relevant policy advantages to achieve Area-Port linkage.

The development mode of network systematization: It effectively integrates many contents covered in this scope, including the harbor, airport, logistics center, and other contents. It conducts advantage complementary on resources so as to achieve mutual development.

This scoring form has come to an end.
Sorry to delay your valuable time. Thank you again for your support!
Wish you happy, successful, and healthy!