

Based on the Study of Industrial Revitalization in Northeast China

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Abstract: Industrial bases in northeast China play a very important role in national economic and social development. We should speed up the adjustment, transformation and revitalization of industrial bases in northeast China. Due to the adjustment of China's economic structure and the improvement of the degree of marketization, the northeast heavy industry base with capital-intensive as its core lacks its self-generating capacity. Northeast Industrial Base is an important industrial base established after the founding of New China, which has laid a solid foundation for the development of China's modern industry. With the gradual implementation of the strategy of revitalizing the Northeast industrial base, the economic development of Northeast China needs the strong support of the Northeast financial system. As an open and complex giant system, the regional economy has some inherently identical laws. In the 11th Five-Year Plan, the Party Central Committee made a strategic decision to revitalize the Northeast Industrial Base, which brought a rare opportunity for economic revitalization in the Northeast. Based on the theory of financial development, this paper studies the level of financial development in the Northeast and proposes policy recommendations for the revitalization of industries in the Northeast.

1. Introduction

Northeast industrial base plays a very important role in the development of national economy and society. Speed up the adjustment, transformation and revitalization of northeast industrial base [1]. It is conducive to enhancing the vitality and development potential of the national economy, promoting the distribution and structural adjustment of the state-owned economy, promoting the coordinated development of the regional economy, and improving the international competitiveness of China's industries and enterprises [2]. Due to the adjustment of China's economic structure and the improvement of the degree of marketization, the northeast heavy industry base with capital-intensive as its core lacks its self-generating capacity [3]. Although China's industrialization process is relatively short, there are also areas with the same performance characteristics as sunset industrial areas in western developed countries, mostly concentrated in the northeast [4]. In a certain stage of economic development, there are always some industries that play a major or even key role in the development of the entire economy, or occupy an important position in the economy. These industries are leading industries and pillar industries [5]. The Northeast Industrial Base is an important industrial base established after the founding of New China. It has laid a solid foundation for the development of China's modern industry and made tremendous contributions to the country's economic construction [6]. Breaking regional divisions and implementing regional cooperation with complementary advantages can provide a space carrier for the adjustment and transformation of the Northeast region and economic development [7]. Through the market leading role, the coordination and guarantee of the provincial government policies to achieve regional development strategy integration is the general trend.

Based on the geographical advantage, the northeast region can make full use of the opportunity of regional economic cooperation in Northeast Asia and break the bottleneck of economic development in the region [8]. Since the reform and opening up, due to institutional and other reasons, the economic development has gradually fallen behind the coastal areas. When the leading industry declines, the region does not cultivate new leading industries, and the entire regional economy is gradually declining. Adjusting and optimizing the industrial structure is closely related to the development of the pillar industry. Establishing and researching the pillar industries occupies

a very important strategic position in improving the industrial structure and even the economic development of the entire Northeast region [9]. Although the leading industries and pillar industries have a special role in overall, the connotations of the two are significantly different. With the gradual implementation of the strategy of revitalizing the Northeast Industrial Base, the economic development of Northeast China needs more and more support from the Northeast financial system [10]. As an open, complicated and huge system, regional economy has some inherent laws in its development. Under the condition of market economy, finance, as a channel for capital accumulation and financing, plays a key role in the allocation of resources. It can be said that finance has become the core of modern economy [11]. In China, too much attention has been paid to the study of leading industries, but the analysis of pillar industries supporting the prosperity and development of the entire economic system has been neglected, which easily leads to strategic mistakes in industrial development.

Periodic fluctuations in regional economic development will cause certain impacts and damages to the economic system, and even lead to an overall recession and contraction of the economic system [12]. Our country's pillar industry is the main business field of the state-owned economy. The development level and benefits of the pillar industry play an important role in the quality and speed of the transformation of the state-owned enterprises' business mechanism, the degree of perfection of the social security system reform and the speed of the socialist market economy. With the acceleration of China's industrialization process and the influence of the global macroeconomic background, some industrial and mining cities and regions in northeast China that rely on these resources are facing major problems such as industrial transition and labor transfer due to the exhaustion of resources [14]. In the 11th Five-Year Plan, the CPC Central Committee made a strategic decision to revitalize the northeast industrial base, which brought a rare opportunity to the economic revitalization of the northeast region [15]. How to seize this historical opportunity and accelerate the revitalization of the Northeast industrial base is an important issue we face. Due to the high risk involved in the investment of related industries in the modern economy, it is objectively required that the regional economic system has a stable and abundant source of funds and a strong "hematopoietic" function, and the formation and development of related industries are more flexible and speedy [16]. Based on the theory of financial development, this paper studies the level of financial development in Northeast China, analyzes the causes of financial backwardness in Northeast China, and proposes relevant policy recommendations.

2. The Realistic Dilemma Faced by the Economic Development of Northeast Industrial Base

2.1. Unreasonable industrial structure

The theory of endogenous economic growth has gradually matured. In the process of studying the relationship between financial development and economic growth, many economists have learned important achievements of endogenous growth theory. At a specific stage of economic development, there will always be certain industries whose shares will increase rapidly and even occupy a pivotal position in the industrial structure. Such industries are called pillar industries. The complementarity of resources and environment decides the northeast industrial base to take the road of regional development with division of labor and cooperation and common prosperity [17]. Developed countries have gone through many industrial revolutions, and industrial transfer is inevitable. With the establishment of the world trade system, the free flow of capital, information, technology and other factors of production in the global scope makes the issue of industrial transfer more and more important. The new economic geography theory expounds the essence of industrial agglomeration based on the assumption of increasing returns to scale [18]. The advantages of mineral resources in the three northeastern provinces are concentrated, but the non-ferrous metal resources which are indispensable to equipment manufacturing industry and metal raw material industry are relatively scarce. The development of financial system can provide more financial instruments with strong liquidity, high security and stable income, and provide more convenient financial services. In the view of some local governments, protecting and supporting local pillar

industries is often a top priority of regional industrial policies.

The rapid establishment, integration, reconfiguration and dissolution of Extension Manufacturing Capability Unit, as well as the rapid diffusion, rapid remodeling and rapid transformation of manufacturing capability. It can provide all kinds of knowledge service activities, such as acquisition at any time, on-demand use and payment, security and credibility, green and high quality, for the whole life cycle process of knowledge service through large data network environment. There are four kinds of flows in the diffusion process of extension manufacturing capability unit. That is resource flow, knowledge flow, capability flow and quality flow. The combined effect of these four streams enables large engineering equipment manufacturing systems to emerge rapidly expanding manufacturing capabilities in a short time. Fig. 1 is a model of Extension Manufacturing Capability Unit.

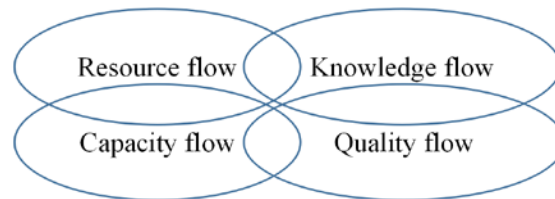


Fig.1. Extension manufacturing capability unit model

In the process of promoting industrialization on a large scale worldwide, due to the interaction of many internal and external factors such as resource conditions, industrial foundation, historical evolution, national policy guidance, regional development has shown great differences. The development of the financial system can form economies of scale, save transaction costs, and have stronger liquidity risk management capabilities. The formation and development of pillar industries are directly related to the scale, capability and level of the development of science and technology and economy in the region. As northeast is China's earliest industrial base, it is the product of the catch-up strategy. Therefore, it has a strong policy burden at the beginning of its establishment. In order to connect the northeast region with Beijing, Tianjin and Hebei, we must first determine the industries with the trend of transfer, which directly affects the possibility of successful connection and is also an important basis for the selection of the connecting industries in the northeast region [19]. The three northeastern provinces have developed transportation, high degree of urbanization, large and medium-sized cities and relatively concentrated population. They all have huge advantages in stock assets, unique geographical location advantages, and numerous advantages in science and technology and human resources, which create a foundation for the combination of northeast China. Developed financial system can provide a convenient and fast financing platform for fund demanders to meet multi-level financing needs. The development of the financial system can increase the savings rate and raise more sufficient capital for economic growth.

2.2. Enterprises Have Higher Non-Economic Costs

A number of traditional industries such as steel, coal, oil and textile have developed rapidly and gradually become pillar industries in some regions. These regions have once become economic growth points within a larger region and have important economic impacts. Under the background of the new round of northeast revitalization, how to successfully connect the northeast region with Beijing-Tianjin-Hebei industrial transfer is an urgent problem to be solved and is also the core content of this paper. Developed countries gradually transfer industries that are at the edge of inferiority in production costs to later countries. After the latter countries embark on the road of industrial development, they will transfer industries to less developed countries. In the case of underdeveloped financial markets, individuals can only invest in productive assets that can be realized at any time in order to prevent sudden liquidity shocks [20]. From the product structure point of view, due to the long-term development of resources and primary processing of products, the industrial economy of Northeast China has formed a situation of paying equal attention to both the manufacture of complex products and the processing of primary products, with fewer final products and more intermediate products. Developed capital markets can effectively diversify the

liquidity risk of investors, and at the same time, they can reduce the risk of uncertain return through portfolio investment. It is very necessary to select and develop the pillar industries. It is the correct choice to adapt to the structural changes of social needs and an important measure to optimize and adjust the industrial structure.

One of the most important issues in the collaborative management of the knowledge service system for manufacturing large data is the in-depth analysis of the large data contained in the manufacturing industry. After sorting out the original input-output tables, the input-output tables of departments are compiled. According to this classification and the calculation formula of the influence coefficient and the stress coefficient, the influence coefficient and the sensitivity coefficient of the four industries can be obtained, as shown in Table 1.

Table 1 Industry influence coefficient and sensitivity index

Industry	Impact index	Sensitivity index
Industry	5.569	14.215
Agriculture	11.655	17.368
Service sector	8.271	10.326
High - tech industry	9.7643	10.373

The function of financial market to disperse and reduce risks has prompted people to invest in less liquid but more productive projects. Northeast Asia cooperation is conducive to the expansion of the internal market and the improvement of the degree of integration, and will also be very beneficial to the market-oriented construction in the northeast region. Northeast China's docking with Beijing, Tianjin and Hebei's industrial transfer has adapted to the new changes in China's regional economic growth pattern, and is also an inevitable choice for northeast China to develop its regional advantages. Since savings mainly come from per capita disposable income, economic growth will increase the disposable income of residents and increase the level of savings, so the level of economic development ultimately determines the scale of capital supply [21]. With the further acceleration of regional economic cooperation in Northeast Asia, the demand for various resources products, raw materials products and manufacturing products will increase substantially, which will greatly promote the development of foreign trade in Northeast Asia. The strength of industrial competitiveness is ultimately tested and judged by the market share and profitability of its products. From the perspective of industrial structure, the regional recession is attributed to the unreasonable industrial structure, and the old economic structure is the common fault of the economic recession area. The prosperity of the economy will create greater demand, prompt enterprises to expand production and increase investment, thus attracting more savings to investment transformation.

3. Analysis on the Development of Industrial Pillar Industry in Northeast China

3.1. Indicators for Measuring the Competitiveness of Local Industries

In the final analysis, the revitalization of Northeast China is to allocate resources, restructure industries and adjust the structure according to the general laws of market economy and international economic practices. Price and non-price factors determine the outcome of product competition in the market. Correspondingly, product competitiveness can be divided into price competitiveness and non-price competitiveness. In addition to resource exhaustion, slow economic growth, large number of unemployed people and difficult operation of enterprises, the prominent problems in Northeast China are convergence of industrial structure and duplicate construction of projects. Northeast China is China's industrial base. In the process of economic construction, it has formed a complete industrial system with good industrial foundation and advanced technology. Consumers' brand retention reflects consumers' perception of the product market and the market performance of various brands in the past. Brand recognition represents consumers' comprehensive evaluation of a brand product and their intention to give priority to purchasing the brand product in the future. It represents brand popularity. From the perspective of the region's own recoverability, it

is believed that the decline of the region lies in the lack of adaptation mechanism and the reduction of the potential of enterprises to pursue profits. The marginal productivity of capital mainly depends on the stage of economic development and the operating efficiency of enterprises. The marketization of economy leads to more intense competition, which will encourage enterprises to improve production efficiency and reduce production costs.

Internationalization, networking, informatization and knowledge-based manufacturing have brought infinite vitality and opportunities to enterprises. The concept of market has also undergone great changes. It will be displayed in front of users in diversified markets such as virtual market, electronic market and commercial market. However, this also makes the formulation of the manufacturing process need to be completed by the process personnel distributed discretely in different process types of processing workshops. In order to realize the optimal and reasonable design of a product, it is usually necessary to introduce various design methods and technologies to achieve the design purpose. A design problem often contains many different design tasks and different design data types. How to extract valuable data from the growing mass of data and make use of it has heralded the arrival of a new wave of industrial revolution. After establishing the index system of venture capital in target industry, the analytic hierarchy process (AHP) can be used to evaluate the project risk comprehensively. Comparing with the same grade index, according to the relative importance of the index, the scale score is given. The weight judgment matrix is constructed. According to the sample data, the weights and evaluation values are obtained as shown in Fig. 2.

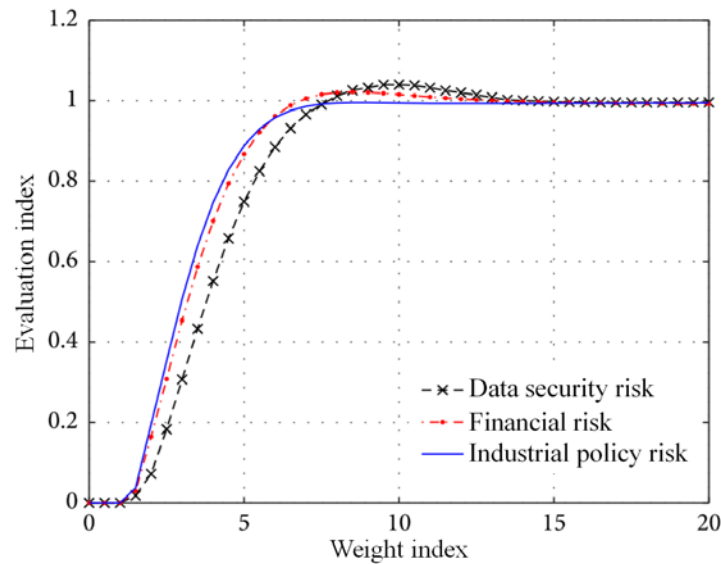


Fig. 2 Data relationship between weight value and evaluation value

There are n indicators for evaluating the independent innovation capability of enterprises. On the basis of these indexes, the independent innovation capability of enterprises is quantitatively divided into T grades, which are described as the following quantitative comprehensive evaluation matter-element models:

$$Q(u_{ij}) = \sum_{i=1}^n \text{Max}_{1 \leq j \leq m} \{g_{ij}(T)\} \quad (1)$$

The matter-element model formed by the allowable value range of each index in the comprehensive evaluation of independent innovation capability is called nodal matter-element:

$$y_{f-n_m} = \sum_{i=1, i \neq n}^N \sum_{l=1}^M \sqrt{p_i} h_{i,n_m}^T w_{i,i_l} s_{i_l} \quad (2)$$

For the enterprise to be evaluated, the detected data or analysis results are expressed by matter element P:

$$d = 2r_b \left(\frac{\sqrt{2}\sigma_R B}{2\sigma_{td}} \right)^{1/\beta} \left(\frac{\sqrt{2}\rho_0 D^2 n k^{-2\gamma} l_e B}{16\sigma_{cd}} \right)^{1/\alpha} \quad (3)$$

The special location advantage of the northeast region and its already formed industrial base determine that the transformation of the northeast industrial base should be carried out in the process of actively participating in the cooperation in northeast Asia and expanding the opening to the north. Due to the close and numerous connections within the enterprise, the sensitivity of the enterprise to changes in external conditions is reduced, which hinders the implementation of the effective behavior of the enterprise. Financial development and economic growth are interactive relations that promote and restrict each other. The benign interaction between the two will effectively promote the sustained and healthy development of the economy. It is because with the development of the industry, the requirements of the burgeoning industries on the location conditions are different from those of the traditional industries, which are concentrated in other regions, thus causing the decline of the once prosperous industrial regions [22]. The existing research results can not solve the problem of industrial transfer and docking in a specific region, and it still needs to be innovated purposefully according to the actual situation. From the perspective of the development process of the world economy, the economic development of various countries and regions has been inseparable from finance, and the level of development and deepening of finance itself has become an important symbol of the level of economic development of a country or region. Strategic cooperation requires that the depth of cooperation enter the scientific and technological research and development link of production process, which is not only limited to high-tech industries, but also includes traditional economic sectors. The development of regional finance not only contributes directly to regional economic development, but also plays an important role in promoting regional economic growth.

3.2. Analysis on Competitiveness of Industrial Pillar Industry

Northeast China should strengthen regional economic cooperation with Northeast Asia and realize leapfrog development of industrialization. From the perspective of economic globalization and international industrial division of labor, the orientation of industrial adjustment and development is determined. The market share of chemical raw materials and chemical products manufacturing industry is declining, but the profit level is rising, indicating that it still has certain competitiveness. Good infrastructure and resources in Northeast China will inevitably attract funds from the other three economic growth poles to the north and provide much-needed technology and transformation funds for industrial base transformation. Due to the serious outflow of financial resources due to the low financial efficiency in underdeveloped areas, it is difficult to find a breakthrough in economic development due to lack of financial support. Any region is in constant development, but also in a wider external environment, if not compared with other regions, can not explain its decline. The market share of the transportation equipment manufacturing industry is relatively low, and the profit level has dropped sharply. The prominent problems are that the industry has too few research and development personnel and the research and development of science and technology is not strong enough. The formation and accumulation of capital plays a vital role in economic development. The promotion of regional finance to regional economy is first reflected in the financial system's ability to use its capital aggregation to promote the formation and accumulation of capital.

The construction and development of China's northeast region should incorporate the concept of sustainable development. The protection of ecological environment and historical and cultural resources in northeast China will be promoted to the same important position as economic development. When facing huge user data, any enterprise needs to find data suitable for its own development characteristics. Only when users' real demand feedback is obtained can enterprises obtain good economic benefits. Each service circuit set must pass as few communication nodes as possible in order to improve the compactness of the topology. Fig. 3 shows the situation of original data and predicted data.

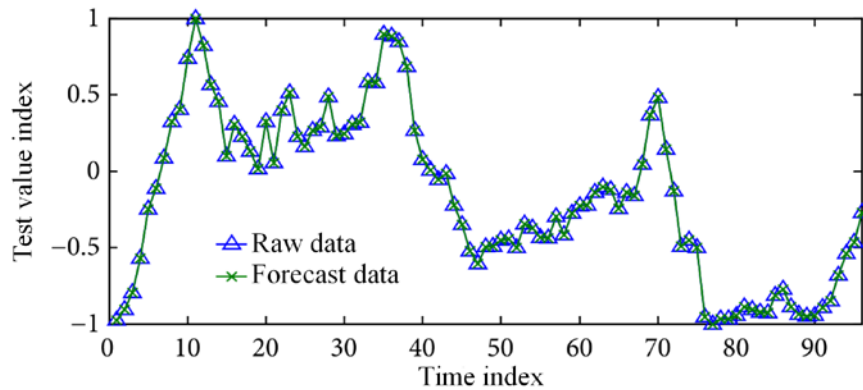


Fig.3. Raw data and forecast data

Develop ecological industry. We will focus on introducing large-scale eco-industrial projects, enhancing radiation-driven capacity, eliminating backward production capacity and promoting industrial transformation and upgrading in Northeast China. It is the earliest and most widely used practice mode to promote the construction of Northeast China by relying on comprehensive ecological management in Northeast China. The design of residential buildings should meet the needs of farmers at different levels. Emphasis should be laid on the establishment of its own exclusive database, including more architectural drawings and design plans, as well as local human information as the basis for design. When setting up the indicators, we should start from the regional system, that is, from the three subsystems of economy, society and environment, to summarize the overall development trend of the region. Within any region, the industrial structure is the main body, and the state of the region is determined by a certain industrial structure and the development trend of various departments.

The higher the degree of regional financial development, the more investment opportunities provided by financial institutions and financial instruments, the more convenient financial services, the stronger people's desire to engage in financial activities. Northeast industrial base needs to strengthen the overall deployment and planning of energy and environment cooperation with Northeast Asian countries or regions. We will gradually establish regional organization and coordination mechanisms for energy and environment, regional fund-raising mechanisms, regional energy and environment standards and assessment mechanisms. The improvement of the regional financial level will also attract the inflow of foreign funds, expand the sources of funds and serve the regional economic development. The market share of the transportation equipment manufacturing industry has been far higher than that of other pillar industries, but the profit level has shown a downward trend and lost its competitive advantage. The degree of financial development in different regions of a country determines the efficiency of capital use in different regions under the same financial system. The economic cooperation between Northeast and Northeast Asia mainly evolved spontaneously under the informal institutional arrangement of regionalization. However, with the rapid development of regional cooperation in Northeast Asia, it is objectively required that the institutional arrangement of regional cooperation move forward from regionalization to regionalism.

4. Conclusion

The revitalization of the northeast industrial base is not only related to the economic and social development of the northeast region itself, but also to the coordinated and balanced development of the national economy of the whole country and to the construction of a socialist harmonious society. Protecting the environment, rationally developing resources and taking the road of sustainable development are important conditions for revitalizing the northeast industrial base. In most raw material industries, the state-owned economy has a high proportion and obvious monopoly position, which leads to insufficient competition in these industries and affects the improvement of the relative productivity of the industries, thus restricting the upgrading of the industrial structure. The

backwardness of the financial development level in Northeast China is closely related to its micro-economic main body, the unified financial policy of the country, the bad credit environment and system in Northeast China. In order to improve the financial development level of Northeast industrial base, corresponding financial countermeasures should be formulated according to the actual situation of Northeast China. Under the guidance of the government's development strategy, we should organize and implement the park planning and investment promotion, and the local government should take charge of social management, so as to realize the innovation of the park management mode. We will continue to accelerate capital accumulation, introduce talents and vigorously cultivate local human resources, improve technology and production technology, and gradually transform into a new industrial structure with capital-intensive and technology-intensive industries as the main industries.

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