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Study on the Optimisation Path of Industrial Structure in Guanzhong-Tianshui City Cluster

-- Titanium industry in Baoji City as an Example

Yue Tan

School of Tourism, Xi'an International Studies University, Xi'an, Shaanxi, China

Abstract: This study aims to explore the optimization path of the industrial structure in the Guanzhong-Tianshui city cluster, with a focus on the development of the titanium industry in Baoji City. Dominated by secondary industry, particularly equipment manufacturing, the city cluster faces issues such as insufficient competitiveness in leading industries, lack of coordinated development, and weak infrastructure. The research identifies that while the titanium industry has a complete industrial chain and significant agglomeration effects, it is hindered by small enterprise scale, insufficient innovation capacity, and product homogeneity. The study proposes specific optimization strategies including enhancing the titanium industry chain, promoting industry collaboration, guiding small enterprises towards niche markets, and strengthening leading companies to boost overall industrial competitiveness. Emphasizing the utilization of local resources and environmental features in alignment with national industrial planning, the research advocates for the advancement towards a high-end, intelligent, and green industrial structure. The findings and suggestions are of significant reference and guiding value for the industrial development of the Guanzhong-Tianshui city cluster and the broader Northwest region.

Keywords: Industrial Structure Optimization; Industrial Agglomeration Effects; Guanzhong-Tianshui City Cluster; Baoji Titanium Industry.

1. Introduction

With the acceleration of globalisation and urbanisation, China's economy has developed significantly and the regional industrial pattern has changed greatly, while at the same time the problem of regional industrial structure has become increasingly prominent. People have begun to pay attention to the differences in industrial structure between different regions and the impact of such differences on regional economic development.

Against this background, people have begun to realise that the impact of the layout of regional industrial structure on regional industries is a complex and important issue. The industrial structure of a region is inextricably linked to economic growth, and the industrial structure is the basis for future economic growth. The industrial structure will also change with the change of economic growth, the industrial structure evolves from low level to high level, the industrial structure is constantly rationalised, and the resources are more reasonably distributed, which will promote the economic growth. Factors such as resource endowment, industrial base and policy environment in different regions will have far-reaching effects on regional industrial structure.

Therefore, the evolution of the industrial structure and the upgrading of the internal structure of industries are the main signs of regional economic development. A reasonable industrial structure is not only conducive to giving full play to regional resource advantages and improving regional industrial economic efficiency, but also a prerequisite and guarantee for the scientific and sustainable development of the region. At the same time, through in-depth study of the impact of the layout of regional industrial structure on regional industries, local governments can be better guided to formulate industrial development policies and promote the sustainable development of regional economy.

2. Status of Industrial Development in Guanzhong-Tianshui City Cluster

Analysing the status quo of industrial development in Guanzhong-Tianshui region This paper mainly puts it under the macro background of the western region, then pushes it to Guanzhong-Tianshui region, and finally analyses the industrial situation of the case place specifically. Thus, from the macro level to the micro level, layer by layer, gradually analysing the current situation of industrial development in the region.

2.1. Status of Industrial Development in the Western Region

In recent years, with the implementation of the Western Development, "One Belt, One Road" and the deepening of the importance attached to the western region, the social and economic development of the western region has been greater, and its economic strength has been greatly enhanced.

The figure (Figure 1) shows the trend of changes in the proportion of value added of the three major industries in the western region from 2006 to 2020, and it can be seen that the proportion of primary and secondary industries was relatively close in 2006-2013, and the proportion of the tertiary industry has been increasing year by year since 2014.

At present, the western region has formed a "three-two-one" industrial structure pattern, which is similar to the national industrial pattern. However, the transformation and upgrading of the industrial structure in the western region is not consistent with that in the eastern and central regions of China. The transformation and upgrading of industry in the western region started late and at a slow pace, with a relatively weak industrial foundation, and the upgrading of the industrial structure usually relies on the conversion of natural

resources, geographic location and other primitive elemental advantages into social productivity, which is quite different from the path of development in the eastern region, such as relying on high and new technologies.

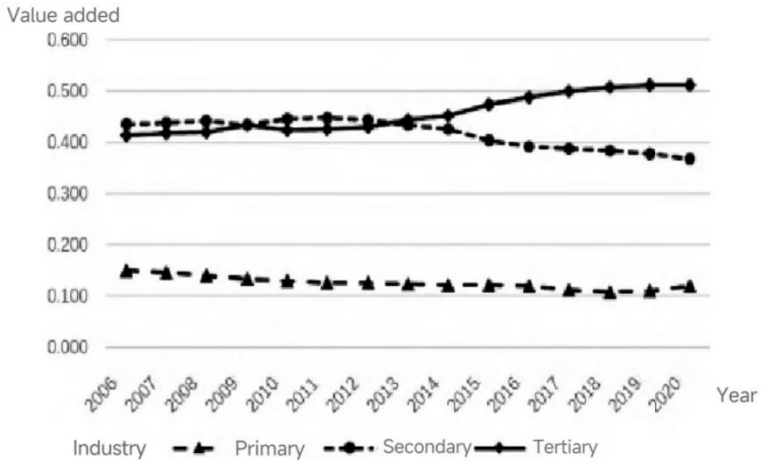

Figure 1. Trends in the proportion of added value of the three major industries in the western region from 2006 to 2020.

2.2. Status of Industrial Development in Guanzhong-Tianshui City Cluster

Modern agriculture: At present, the Guanzhong-Tianshui Plain urban agglomeration has achieved certain results in such areas as eco-agriculture and technological innovation in dry-farming, and has constructed a sound system of modern agricultural industrial belts by virtue of speciality agriculture. However, the agricultural industry in the economic zone still suffers from low added value of agricultural products, lack of an image of origin and a unified regional brand for agriculture, which are bottlenecks restricting the further enhancement of the quality and efficiency of agriculture in the economic zone.

Equipment manufacturing industry: The equipment manufacturing industry in the Guanzhong-Tianshui Plain urban agglomeration, represented by electronic and communications equipment, extra-high-voltage power transmission and transformation equipment, automobiles, numerically-controlled machine tools, engineering machinery, special-purpose equipment and solar cells, is concentrated in the economic zones of Xi'an, Xianyang, Baoji and Tianshui. Guanzhong - Tianshui Plain City Cluster is located in the hinterland of northwest China, the degree of market openness is not high, the mechanism is not sound, the development of the equipment manufacturing industry in the region is more dependent on the land, capital, labour and other primary factors of production inputs, senior factors of production is still difficult to give full play to its role.

Cultural tourism: The Guanzhong-Tianshui Plain urban agglomeration is not only blessed with beautiful natural scenery, but is also the main birthplace of Chinese civilisation and the starting point of the Silk Road on the ancient roads of China, with a long history and a rich cultural heritage. Relying on rich natural, historical, religious and human resources, the Guanzhong-Tianshui Plain Urban Agglomeration has made great efforts to develop tourism with special characteristics, and created a number of high-quality tourist areas and high-quality tourist routes.

2.3. Case Place: Industrial Development Status in Baoji City

The annual GDP of Baoji City in 2021 was 241.749 billion yuan, an increase of 6 per cent over the previous year. Among them, the added value of primary industry is 1.382 billion yuan, an increase of 6.7 per cent; the added value of secondary industry is 5.523 billion yuan, an increase of 4.4 per cent; the added value of tertiary industry is 6.671 billion yuan, an increase of 8.2 per cent. The structure of the three industries is 1:6:4 (Figure 2).

Overall, the current industrial development situation in Baoji is in line with the overall development trend of the western region, which is still dominated by the secondary industry, with the tertiary industry gaining significant momentum. (Source: Baoji Statistics Bureau)

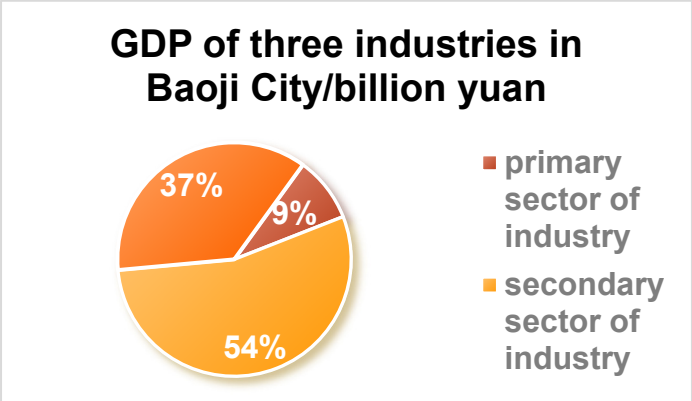

Figure 2. Proportion of production in three industries in Baoji City

2.4. Overall Assessment of the Current Status of Industrial Development in the Guanzhong-Tianshui Urban Agglomeration

From the macroscopic western region of China, to the mesoscopic Guanzhong-Tianshui region, to the microscopic Baoji City, the development of its industries is mainly dominated by secondary industries with high energy consumption. Because the western region is rich in coal, natural gas and water resources, it has become an important base for national energy supply. At the same time, new energy industries are also booming in the western region, with clean energy such as solar and wind energy becoming the focus of future development.

In addition to this, manufacturing and high-tech industries have flourished in the western region. The Government has encouraged enterprises to move to the western region, which has boosted the development of the local manufacturing industry. At the same time, the construction of high-tech industrial parks has attracted a large number of science and technology enterprises, injecting new momentum into the industrial upgrading of the western region.

From the Guanzhong-Tianshui Economic Belt to the Guanzhong-Tianshui region to the Guanzhong-Tianshui City Cluster, the scale of the city cluster is getting bigger and bigger, and the process of its development is accelerating year by year, with the industrial foundation constantly being strengthened, the transformation of the energy industry being accelerated, and the steady development of the aerospace industry, the equipment manufacturing industry, and the electronics and information industry, among other industries. Although the development strategy of Guanzhong-Tianshui City Cluster has been implemented and the development of cities represented by Baoji, Tianshui and Yuncheng has seen great changes, the development of the city cluster is still facing some outstanding problems. The main problems are the weak competitiveness of the region's leading industries and the low level of synergistic development; the weak infrastructure construction; the loss of talent training; and the conflict between the pursuit of economic interests and the protection of environmental science and technology sustainability. Therefore, this paper analyses the industrial structure and resources of the Guanzhong-Tianshui city cluster, and selects a case study to develop a dominant industry in the city cluster, optimise the industrial structure, and promote the synergistic development of the cities with the optimised development of the industry, so as to enhance the competitiveness of the region.

3. Latest Research Progress

3.1. Characteristics of the Evolution of Global Industrial Structure

(1) Industrial materialisation: The international financial crisis that occurred in 2008 led developed countries and regions to realise the seriousness of the problems of industrial virtualisation and hollowing out, and they have stepped up their efforts to push forward "re-industrialisation", promote the return of the manufacturing industry, and vigorously develop the real economy.

(2) Layout into the shore: In the past half century, under the impetus of the theory of comparative advantage in the division of labour in trade, world trade has developed rapidly, and the global economic cycle has gradually formed a pattern of consumer, producer and resource countries.

(3) High-end technology: Countries are constantly stepping up their efforts to seize the high ground of various technologies and compete for the right to speak in the industry in terms of technology, standards and leading enterprises.

(4) Specialisation in the division of labour: As a result of the new crown epidemic, coupled with geopolitical influences, global cross-border investment has become markedly differentiated, and the imbalance between North and South has intensified. The manufacturing industry in developed countries is growing fast, and the growth of developing economies is slow. Under the guidance of industrial policy, the supply chain layout of multinational enterprises has shifted from the traditional cost-efficiency orientation to a greater emphasis on security and specialisation, and the division of the global industrial chain value chain has intensified.

(5) Geopolitics: Global economic competition is increasingly tainted by geopolitical risks. As the world enters a new period of turbulence and change, the risk of various "black swans" and "grey rhinoceros" events such as new crown epidemics, regional conflicts and sovereign debt crises is on the rise, and the trend of anti-globalisation is continuously brewing, and all countries have to take the promotion of industrial development and policy security as important considerations. The influence of geopolitics on industrial layout and structural adjustment has become more and more profound.

3.2. Characteristics of the Evolution of Industrial Structure in the Western Region

Regarding the upgrading and evolution of regional industrial structure in China, Feng et al. (2011) and others believe that productivity growth mainly comes from within the industrial structure, especially within the secondary industry; the degree of structural change of the labour force is accelerating, and the labour factor has an obvious "structural dividend". According to He Yude (2017) and others, the upgrading of industrial structure is synergistic with the transformation of enterprises, industrial support, regional development platforms, and scientific and technological innovation. Lu Man (2017) and others believe that the optimisation path of industrial structure can be studied from the perspective of improving the level of infrastructure construction, enriching the service system of the tertiary industry, and expanding the capacity of opening up the outward-oriented economy. At the same time, some foreign scholars also believe that the evolution and development of industrial structure needs to be initiated by enterprise-level institutions and take the green development path (Trippl, Michaela 2020).Rypestøl, Jan Ole (2017) believe that future research work should pay closer attention to the extension of industrial paths, path renewal and path creation.

Based on the location of the Guanzhong-Tianshui city cluster, Cui Yan (2023) et al. argue that the collaborative development of city cluster industries can formulate industrial development plans at the city cluster level; establish a long-term mechanism to break through the administrative barriers and improve inter-provincial cooperation in city clusters; and gradient industrial development policies to actively promote

the construction of sub-centre cities. Wang Baozhong (2018) and others believe that the optimisation of regional industrial structure needs to play the fundamental role of the market; play the driving effect of core enterprises in the integration of the industrial chain; and continue to promote the construction of industrial parks to effectively gather industrial clusters. Zhang Xinli (2018) and others believe that the industrial evolution of Guanzhong-Tianshui city cluster needs to establish a perfect regional economic cooperation mechanism; accelerate the development of advantageous industries to drive the regional economy; strengthen the construction of industrial agglomeration to improve the quality of industrialisation; vigorously develop the tertiary industry to optimise the industrial structure; and implement the talent strategy to ensure the supply of talents. Ma Chunzi (2016) and others believe that the optimisation and upgrading of industries in Guanzhong Tianshui region needs to start from the aspects of fiscal policy, tax policy, accelerating industrial structure adjustment with circular economy as a breakthrough, taking high-end industrial agglomeration as the focus point of industrial structure optimisation as well as from the talent support system.

3.3. Review of Research Progress

According to the latest research progress at home and abroad, it is found that the common points are, firstly, they all aim to drive economic development through the development of the secondary industry, believing that the economic growth comes from within the industry; increase the green and sustainable development of the secondary industry; secondly, they hope to launch the industrial optimisation path from the relevant enterprises within the industry, and give full play to the power of the market; thirdly, to strengthen the cooperation, and to establish and improve the mechanism for the regional economic cooperation; and fourthly, to increase the talent construction, and attract talents to move back from the policy level, economy and so on. Through the above research, it can be found that the current research is still deficient, on the one hand, neglecting the development of regional characteristic industries and the formation of regional characteristic industrial chain; on the other hand, the development path of industrial upgrading is overly reliant on heavy industry, while neglecting other industries.

Therefore, for the western region, especially the Guanzhong-Tianshui urban agglomeration, the development of the region still relies on the secondary industry, but the speed of development is far less than that of the eastern region. In this regard, the Guanzhong-Tianshui region can give full play to its resources, geographical location and other advantages, develop advantageous industries with regional characteristics, and continuously form a complete speciality industry chain, so as to improve the strength of regional economic development and regional competitiveness.

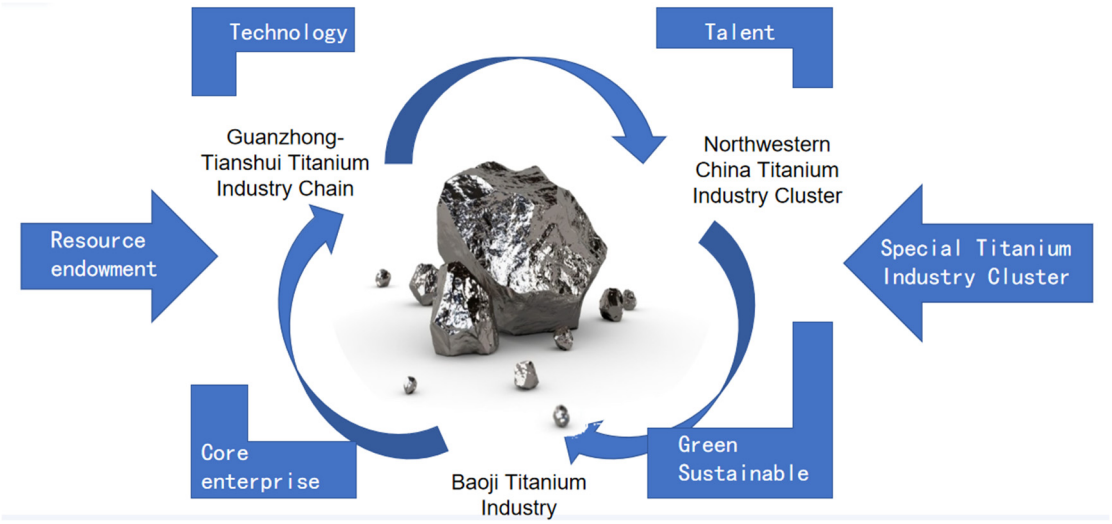

Figure 3. Research Framework

According to the current global ilmenite production, China is very rich in titanium resources, and is a major titanium resource country in the world, with its reserves at the forefront of the world. China's titanium deposits are relatively complete in terms of ore industrial types, both primary and secondary, primary vanadium-titanium magnetite is the main industrial type in China. Ilmenite accounts for 98 per cent of the total reserves of titanium resources in China. There are 142 titanium deposits in China, which are distributed in 20 provinces and districts, with the main origins in Sichuan, Hebei, Hainan, Hubei, Guangdong, Guangxi, Shanxi, Shandong, Shaanxi, Henan and other provinces. From the point of view of titanium processing material production, globally, according to relevant data, the global titanium processing material production in 2022 is in the range of 21-21.5 million tonnes. Domestically, according to the data of China Nonferrous Metals Industry Association Titanium Zirconium Hafnium Branch, China's titanium processed material output reached 151,000 tonnes in 2022, up 11.0% year-on-year. Among them, the embryo material output is about 12,000 tonnes, and the finished processed material output is 140,000 tonnes. In terms of production distribution, the domestic production of titanium processed steel is mainly concentrated in Shaanxi, Jiangsu and Zhejiang regions, and the Pearl River Delta region, of which the production of titanium processed steel in Shaanxi Province accounts for more than 50% of the domestic production. From the summary of listed companies in China's titanium industry in 2022 , the enterprises represented by BaoTai Corporation in Baoji City, Shaanxi Province, as well as its branch, BaoSe Corporation, account for a large number of listed companies. Therefore, this study chooses Baoji City BaoTai Stock as the research case place, investigates and researches its industrial development situation, combines the regional technology,

talents and resources, and takes the core enterprise as the representative, and forms an industrial chain with regional characteristics for the development of titanium industry in Baoji City (such as Fig. 3). At the same time, it is also necessary to Guanzhong sustainable development concept, the characteristic titanium industry chain will be pushed to the Guanzhong-Tianshui region, and gradually expand to the northwest region and even the whole country.

4. Study Cases

4.1. Basic Information about the Case Site

Baoji is located in the middle of Shaanxi Province, in the hinterland of the Qinling Mountains, bordering the city of Xi'an in the east, Gansu Province in the west, Hanzhong City in the south, and the Weihe River Basin in the north, with the terrain high in the east and low in the west, and with a mild and humid climate and four distinct seasons. Agricultural resources mainly grow wheat, corn and other food crops, but also developed special agricultural products such as apples, walnuts and kiwis; industry Baoji is a traditional industrial base with a strong industrial base, represented by companies such as BaoTai Group, DongLing Group, BaoQiao Group and so on.

4.2. Titanium Industry in Baoji City

Baoji is known as "the cradle and flagship of China's titanium industry", is China's titanium and other rare metal materials processing, research and development, application and large-scale production and operation of important raw materials base. One of the most typical of BaoTai, BaoTai Group Co., Ltd, was founded in 1965, is the country's "Third Five-Year Plan" during the period to meet the needs of national defence and military industry, cutting-edge science and technology development, with the "nine hundred and twenty-two" for the project code and investment in the construction of the state's key enterprises. At present, BaoTai Group has become China's largest production and research base of titanium and titanium alloys as the main specialised rare metals, with three major industrial sectors such as titanium materials, equipment design and manufacturing, new materials, forming a complete titanium industry chain from titanium sponge ore mining to smelting, processing and deep processing, equipment manufacturing.

Baoji's industrial chain is complete, gathering scale is remarkable. At present, Baoji has formed a production chain from titanium sponge → titanium solution ingot forging billet → rolling (rolling plate, rolling pipe, wire drawing, etc.) → various material products → titanium equipment manufacturing → various titanium deep processing products. As of March 2021, Baoji has all kinds of titanium production enterprises more than 590, of which 92 enterprises on the regulation, formed a set of research and development, production, sales, service in one of the whole industrial chain, titanium industry scale ranks first in the country, the world's second, titanium annual output accounted for more than 40 per cent of the country's total output.

Therefore, in terms of geographic location conditions, resource conditions, economic development conditions, and the foundation of the speciality industry chain, Baoji City is representative of the Guanzhong-Tianshui City Cluster, and it is more convenient for in-depth field investigation and research, so it can be used as a case study for this research.

4.3. Problems in the Development of Titanium Industry in Baoji City

(1) Industrial planning is unreasonable: Baoji Titanium Industrial Park was built in 2018, but before that, the titanium industry in Baoji has experienced more than ten years of free development, the overall planning of the industrial chain is missing, the layout of the high, medium and low end is unreasonable, the low and medium-end production capacity is in excess, and high-end products need to be imported.

(2) Lack of core competitiveness: in addition to leading and backbone enterprises, the rest of the enterprise's technological level is low, and the innovation ability is not strong; product homogenisation is serious, and concentrated in the low-end, quality level is not high, high-end R & D is insufficient, there are only a few enterprises with production capacity and technological advantages, the industry's overall market competitiveness is insufficient, and the operation of the larger fluctuations.

(3) Raw material price fluctuations have a greater impact on the industry: in recent years, titanium sponge and other raw material prices continue to fall, an average annual decline of 5,000-1,000 yuan, resulting in a decline in product prices of 2,000-3,000 yuan. Baoji titanium enterprises on the upper reaches of the lack of control of raw materials, enterprises have to buy a large number of raw materials in advance to reduce costs or suspend production.

5. Data Sources and Research Methodology

5.1. Data Sources

The data source of this study is mainly obtained through questionnaires and interviews, in the research process mainly investigated BaoTai shares, as well as about the titanium industry production of other small enterprises and individual titanium material sales department. In addition, the production and sales status of titanium industry in Baoji City in recent years is mainly from the official government website and the official website of enterprises. Other information about policies is mainly from the government's latest working report. The following are six specific analyses from the scale and number of enterprises in Baoji's titanium industry, sources of raw materials, production technology and equipment, product variety and quality, domestic and international sales status, as well as investment in technological research and development and innovation.

(1) Size and number of enterprises

At present, Baoji City has about XXX titanium industrial enterprises, mainly concentrated in the Titanium Valley Development Zone in Baoji High-tech Zone and the Titanium Industrial Park in Weibin District. From the point of view of enterprise scale, small and medium-sized private enterprises are the main ones, and there are fewer large enterprises. These enterprises have high production capacity of titanium products.

(2) Sources of raw materials

The raw materials of titanium enterprises in Baoji City mainly come from the domestic market, and some of them need to be imported from abroad. The quality and price of domestic raw materials fluctuate greatly, which affects the production costs and benefits of enterprises. Therefore, enterprises need to strengthen raw material procurement and inventory management, while strengthening cooperation with

domestic and foreign raw material suppliers to improve the stability and quality of raw materials.

(3) Production technology and equipment

The production technology and equipment of titanium enterprises in Baoji City are more advanced, but the overall level needs to be improved. The production technology and equipment of some enterprises are relatively backward and need to be updated and upgraded. At the same time, enterprises need to strengthen the investment in technology research and development and innovation, to improve the technical content and added value of products.

(4) Product range and quality

Titanium enterprises in Baoji City have a wide range of products, covering various fields such as titanium rods, titanium plates, titanium tubes, titanium wires and so on. However, the product quality of some enterprises is unstable, which affects the sales and market competitiveness of the products. Therefore, enterprises need to strengthen quality management and quality control to improve product quality and stability.

(5) Sales in domestic and overseas markets

The products of titanium enterprises in Baoji City are mainly sold to the domestic market, and some products are exported to foreign markets. The domestic market demand is relatively stable, but the foreign market demand fluctuates greatly. At the same time, enterprises need to strengthen marketing and brand building to improve product awareness and market competitiveness.

(6) Investment in Technology R&D and Innovation

Titanium enterprises in Baoji City have low investment in technology research and development and innovation, and the overall innovation capacity is insufficient. Some enterprises lack the awareness and ability of independent innovation, and technological bottlenecks constrain the development of enterprises. Therefore, enterprises need to strengthen the investment in technology R&D and innovation, and improve their independent innovation ability and core competitiveness.

5.2. Research Methodology

(1) Questionnaire method

Questionnaire survey method refers to the method of collecting data and information by creating a thorough and detailed questionnaire that respondents are asked to fill in and answer. It is a common tool used to obtain data and information in social research studies and academic research. The questionnaire survey method requires designing a qualified questionnaire, selecting suitable respondents for the problem under study, and then testing the reliability and validity of the data collected from the questionnaire through SPSS software to prove that the questionnaire and data are reasonable and valid, and then finally carrying out all kinds of analyses on the data of the questionnaire to arrive at the final results of the study.

This paper adopts the network and on-site distribution of questionnaires, Baoji City on the titanium industry production and sales of enterprises related to the launch of the investigation and research, the questionnaire content around the enterprise scale, the sales situation, facing the dilemma and other issues to carry out. The questionnaire was modified after the pre-survey, formally distributed to survey the tourists, and the questionnaires were recovered after collecting enough questionnaires to screen out the valid questionnaires, and then the SPSS software was used to carry out the next step of the analysis and research, so as to put forward the suggestions for the path of development of the titanium industry in Baoji, and then to provide reference for the optimisation of the titanium industry in Guanzhong-Tianshui region, so as to form the regional characteristics of the industrial structure and industry chain, and ultimately to promote the national development of the titanium industry. This will form the characteristic industrial structure and industry chain of the region, which will eventually be extended to the whole country.

(2) interview method

Interviewing is a basic psychological research method that involves face-to-face conversation between the interviewer and the interviewee to understand the psychology and behaviour of the interviewee. Based on the degree of standardisation of the interview process, it can be classified into structured and unstructured interviews. The interview method can provide insight into the thoughts, feelings and experiences of the interviewee and help the researcher gain a more comprehensive understanding of the research subject. In addition, the interview method can establish an interactive and trusting relationship between the researcher and the interviewees, and promote the exchange and sharing of information. Therefore, the use of the interview method can, to a certain extent, make up for the shortcomings of the questionnaire survey method, which can more comprehensively grasp the information of the respondents, and analyse the research problems more deeply and accurately.

6. Summary of the Study

6.1. Analysis of the Development Path of Titanium Industry in Baoji City

Baoji titanium industry should be guided by the "double cycle" strategy, accelerate the improvement of the industrial chain system, promote the local stable cycle, and strive to grow the strength of industrial clusters. Baoji titanium industry transformation and upgrading will achieve breakthroughs in the following areas:

First, further improve the industrial chain, accelerate the pace of extension to the upstream industry, through mergers, acquisitions and other ways to the titanium ore, titanium sponge and other industries upstream extension to enhance the control of the industry upstream. The second is to strengthen the role of titanium industry associations, do a good job of industry planning and guidance, and promote the balanced development of manufacturing, R & D, design, logistics, sales and other industrial links, in order to enhance inter-industry synergies, in order to expand the internal cycle of the titanium industry to consolidate the foundation. Third, to guide many small titanium enterprises to choose product segments, focus on a single field, the product line from "small and many" to "small and precise" transformation, cultivate brand fist products. Fourth, the growth of leading enterprises, focusing on high-end product development and enhancement of medium and low-end titanium enterprises geese driving effect.

6.2. Summary of the Study

The adjustment of industrial structure and layout is a long-term evolutionary process that implies profound economic and industrial laws. Global industry is an interconnected and interdependent whole. In the face of the deep adjustment of the global industrial structure, it is necessary to speed up the promotion of new-type industrialisation, give full play to the

advantages of China's socialist market economy system, the supply advantages of the most complete industrial system in the world and the advantages of the mega-market, coordinate the two domestic and international markets and two kinds of resources, speed up the construction of a new pattern of development, and form a new advantage in global competition.

Guanzhong-Tianshui city cluster is an important part of China's economic development, and its industrial structure and layout have a significant impact on the economic development of the whole country. On the one hand, the industrial structure of Guanzhong-Tianshui City Cluster is mainly dominated by traditional industries. Although it has changed in recent years, it still has certain limitations. Therefore, Guanzhong-Tianshui City Cluster needs to pay more attention to industrial upgrading and transformation, and increase support for emerging industries. On the other hand, there is an imbalance in the industrial layout of the Guanzhong-Tianshui City Cluster, with some regions lagging behind in terms of industrial development. Therefore, it is necessary to promote the balanced development of the industrial layout of the Guanzhong-Tianshui urban agglomeration through policy guidance and financial support to achieve the optimisation and upgrading of the industrial structure.

6.3. Inspiration and Reflection

The industrial structure and layout of the Guanzhong-Tianshui urban agglomeration need to take full account of local resource endowments and environmental characteristics. These areas have rich natural resources and vast land, and industrial layout should be carried out in accordance with local advantageous industries and resource characteristics, so as to achieve the maximum use of resources and maximise economic benefits.

The industrial structure and layout of the Guanzhong-Tianshui urban agglomeration need to be coordinated with the overall industrial layout of the country. The central Government should reasonably guide the industrial development of the central and western regions in accordance with the overall national development strategy, so as to avoid over-concentration of certain industries, which would lead to a waste of resources and environmental pollution.

The industrial structure and layout of the Guanzhong-Tianshui urban agglomeration also need to take full account of talent training and technological innovation. By strengthening education and training and technological innovation, the industrial competitiveness of the central and western regions can be improved and sustainable development can be achieved.

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Appendix

Questionnaire on the development of titanium industry in Baoji City

Dear friends:

Hello! I am a student of Xi'an International Studies University, and in order to complete the course thesis topic research, I need to conduct a survey and research on the development situation of titanium industry in Baoji City. This survey is only as academic research, your information will be strictly confidential, please rest assured! I hope you can truthfully fill in this questionnaire according to your personal real feelings!

Thank you very much for your help and co-operation! We wish you a happy life!

I. Basic information (your background information is important for studying differences in the experiences of different groups, please tick the appropriate box)

1. Your gender:
A.Male B.Female

2. Your age:
A.18 and under B.19-30 C.31-40

D.41-50 E. 51-60 years F. 60 years and over

3. Your education level:
A. Junior high school and below B. Middle/high school

C. College/Undergraduate D. Master and above

4.The department you are from:
A. Technology development department

B. Sales department

C. Finance department

D. Competent authority E. Others

5. Your monthly income:
A.$2000 and below B.$2001-4000 C.$4001-6000

D. $6001-8000 E. Above $8000

II. Development of BaoTai

1. Your working hours at BaoTai:
A. Less than one year B. 1-3 years C. 3-5 years

D. 5 years and above

2. What you do at BaoTai:
A. Titanium material processing B. Quality control

C. Material assembly D. Others

3. Source of titanium material in the plant:
A. Foreign imports B. Domestic market

C. Other sources

4.The size of this business:
A. Small and medium-sized private enterprises

B. Large private enterprises

C. State-owned enterprises D. Others

5. Domestic and overseas sales of our company:
A. dominated by the domestic market

B. dominated by the foreign market

C. Domestic market as the mainstay and foreign market as a supplement

D. Equal distribution of domestic and foreign markets

6. Our company's product range:
A. Titanium rods B. Titanium tubes C. Titanium wires

D. Titanium plates E. Others

7. Problems that you think still exist in the development of the business:
A. Small market B. Insufficient innovation

C. Single product

D. Insufficient publicity E. Others

Interviews on the development of titanium industry in Baoji city

Dear friends:

Hello! I am a student of Xi'an International Studies University, and in order to complete the course thesis topic research, I need to conduct a survey and research on the development situation of titanium industry in Baoji City. This survey is only as academic research, your information will be strictly confidential, please rest assured! I hope you can truthfully fill in this questionnaire according to your personal real feelings!

Thank you very much for your help and co-operation! We wish you a happy life!

1. Are you a local?
2. How many years have you worked here?
3. Does your income cover your family's daily expenses?
4. Do you know the history of titanium industry in Baoji? Can you tell us more about it?
5. What are Baoji's strengths and characteristics in the titanium industry?
6. What are the challenges and difficulties facing the development of the titanium industry in Baoji City?
7. What measures and policies have the Baoji government taken to promote the development of the titanium industry?
8. What is the future direction and plan for the development of titanium industry in Baoji?
9. What other suggestions and comments do you have for the development of the titanium industry in Baoji?