

STUDY ON EVALUATION AND PROMOTION PATH OF ALUMINUM DEEP PROCESSING IN BAISE CITY *

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Abstract

The aluminium industry is the backbone of Baise city. At a time of rapid economic and social development, the demand for aluminium products is not only growing, but also the competition for them is intensifying. Therefore, the aluminium deep processing industry plays a crucial role in the economic growth of Baise city as well as in the cultivation of new growth points. In this paper, the current situation of aluminium deep processing in Baise city is analyzed so that the gray correlation degree method is used to evaluate the aluminium deep processing in Baise city. On the basis of this, recommendations are made for the improvement path of aluminium deep processing in Baise city.

Keywords: deep processing, aluminium industry, gray correlation degree

Introduction

As the aluminium industry continues to mature technologically, the technological barriers in the alumina and electrolytic aluminium segments are becoming lower and lower. At the same time, the financial barriers are being lowered by the support or intervention of local governments. As a result, their position in the aluminium industry chain is decreasing.

The high fragmentation of capacity and the overcapacity of alumina-electrolysis in China has led to a further deterioration in the fortunes of these intermediate companies and has accelerated the transfer of industrial profits upstream to both ends. In particular, the dramatic expansion of the aluminium industry, stimulated by growing demand and local government investment impulses, has led to an increased reliance on bauxite resources. As a result, the bauxite link in the aluminium industry chain is becoming heavier and heavier, and the added value is becoming higher and higher. At the same time, the downstream aluminium deep processing segment involves high-end areas such as branding, technology and marketing, which are technology-intensive and capital-intensive. Therefore, it rightly belongs to the high value-added segment. In practice, the main source of revenue for the world's largest aluminium companies is the downstream segment.

Based on the existing situation, the profits of the aluminium industry clearly tends to the control of bauxite resources, and has the aluminium processing technology of the industry chain is well concentrated. The individual alumina plants, electrolytic aluminium plants or aluminium processing plants as intermediate links are much less resilient to risk. Its profitability is not only influenced by the links in the upstream and downstream product chain, but it is also in the lower segment of industrial profitability. They either do not maintain optimum efficiency over the long term or face the fate of being acquired by a large aluminium company after a period of operation. Aluminium is the most typical case of China's success in

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recent years in terms of aluminium industry chain integration. Over the course of several years, Chinalco has increased its monitoring of electrolytic aluminium and aluminium producers through a strategy of restructuring and mergers, and has actively participated in the implementation of foreign bauxite projects. Alumina production projects were built through joint ventures in order to form a complete industrial chain from bauxite - alumina - electrolytic aluminium - aluminium deep processing. The history of the development of Chinalco has not only been improved, but also the history of restructuring and mergers in China's aluminium industry has been changed. The decentralized aluminium industry has been turned into an industry with a certain degree of concentration in order to improve competitiveness as a whole.

Therefore, if China's aluminium industry is to develop healthily and narrow the gap with the aluminium industry of developed countries, it must accelerate the integration of the upstream and downstream of the industry chain as well as increase the level of aluminium deep processing.

Research Objectives

The research is mainly studied on evaluation and promotion path of aluminium deep processing in Baise city.

Related Literature Review

Current State of Research in Deep Processing

In recent years, scholars in China have conducted research on the development of deep processing industry. The research results mainly focus on the current situation, problems, development trends and countermeasures for improvement of deep processing industry. Some scholars have also studied the strategic environment, development model, development strategy, competitiveness and development of industrial clusters within a certain geographical area. For example, Wang Zhaoxin (2009) analyzed the actual situation of the corn deep processing industry and the development of enterprises within the industry in Jilin Province, and constructed a model for the development of the corn deep processing industry that is in line with the provincial conditions of Jilin Province. Cheng Yunxing et al (2010) used game theory to analyse the choice behaviour between agricultural processing enterprises and farmers.

At the same time, he proposed the construction of an agricultural supply chain and the implementation of supply chain management in order to protect the interests of all parties. Wu Jianqiang(2009) in "Study on the Competitiveness of China's Aluminium Industry", based on a consideration of the existing problems of the competitiveness of China's aluminium industry, uses the evaluation system of competitiveness indicators, five competitiveness models, the four elements of the "diamond" model and the analysis of core competitiveness elements. The multi-level fuzzy evaluation method and the comprehensive index evaluation method are combined with static analysis and dynamic analysis to conduct an in-depth study on the competitiveness of China's aluminium industry (including the current situation, problems and strategies of aluminium deep processing in China). At the same time, he proposes strategies to enhance the competitiveness of China's aluminium industry.

Many scholars have made in-depth researches on the problems of aluminium deep processing in Baise City. Zhao Yue (2018) pointed out in the "Study on the Development

Strategy of Aluminum Industry in Guangxi" that the development of aluminum deep processing in Baise City is not sufficient. Although some enterprises in Guangxi have started to produce aluminum foil for electronics, automobile parts, rail transportation, aerospace and other high value-added aluminum products, a high-end aluminum processing industry cluster with strong competitiveness has not yet been formed, and a science and technology innovation system combining industry-university-research with each other has not been established. At the same time, the innovation and research platform also fails to serve the aluminium industry in the region, and it lacks the technical research and development capacity to serve aluminium industry deep processing enterprises. It has weak policy support for aluminium deep processing enterprises, and its lack of targeted, continuous and systematic encouragement policies. Pu Bing(2020) pointed out in the article "Thinking and Suggestions on the Aluminium Industry and the Second Venture in Guangxi" that the development of aluminium deep processing is insufficient. The technology of aluminium processing in Guangxi still stays in the primary stage, and the added value of aluminium processing products is low, 70% of the products are simple construction profiles. Only about 10% of aluminium processing products are high value-added high purity aluminium, aerospace, etc.

A small number of enterprises in Guangxi, such as "Alnan Aluminium Inc.", have positioned their future product development direction as high value-added aluminium products through industrial transformation, such as aluminium for aviation, aluminium for rail transportation, aluminium for automobile parts, electronic aluminium foil, etc. However, at present, most of the aluminium processing enterprises in Guangxi are still roughly operating, their technology and equipment is backward, lack of innovation, capital and talent support and other aspects are seriously inadequate.

This has greatly affected the enhancement of the core competitiveness of the whole industry. In the meantime, the following strategies and recommendations for the aluminium industry deep processing in Baise city are presented. It includes the development of precise investment promotion for aluminium deep processing projects, the establishment of a reserve project bank for aluminium deep processing, the preparation of an investment promotion manual, the formulation of preferential policies and the simplification of the project approval process. In accordance with the idea of "consolidating the upstream, developing the midstream and making efforts in the downstream", special investment activities have been organized in the aluminium-related counties and industrial parks in the region, and the docking of demand between the aluminium industry and new energy vehicles, rail transportation, aerospace, ships and marine engineering, military industry, aluminium for home appliances, new generation information technology and other fields has been strengthened.

Leading companies such as "Alnan Aluminium Inc." and "Liuzhou Yinhai Aluminium" are actively supported to vigorously develop aluminium alloys and aluminium deep processing products to further extend the industrial chain and thus develop into end-use manufacturing industries such as aluminium components.

Xu Feng (2019) pointed out that the lack of deep processing and technological innovation capacity of aluminium products in Baise City leads to low added value of products.

The main reason is that the key technological bottleneck is yet to be broken. Baise City's bauxite ore has a high content of impurities such as iron and silicon. So it also produces alumina with a high content of impurities, which affects the quality of electrolytic aluminium and makes it difficult to be used for the production of high-end aluminium alloy materials. And there is not enough policy support. There is a lack of targeted, continuous and systematic incentives

like the construction of regional power grids and electrolytic aluminium projects. There is a general lack of innovation capacity in aluminium processing enterprises. The lack of capital, talent, technology and equipment support also affects the core competitiveness of enterprises.

Current Status of Aluminium Deep Processing in Baise City

The aluminium industry is a pillar industry of Baise city, and the aluminium processing industry plays a vital role in optimizing Baise city's economic growth and cultivating new growth points. However, the requirements of economic transformation and upgrading and high-quality development have challenged Baise City's aluminium processing industry, which has long been at the low end of the industrial chain. At present, Baise City's aluminium industry has formed an annual production capacity of 21 million tons of bauxite, 8.6 million tons of alumina, 1.87 million tons of electrolytic aluminium, 3.2 million tons of aluminium processing and 1 million tons of chemical aluminium. In 2019, Baise City's alumina production was 8.46 million tons, accounting for 100% of Guangxi's total production and 11.67% of the country's total production; electrolytic aluminium production was 1.85 million tonnes, accounting for 81.50% of Guangxi's total production and 5.18% of the country's total production; aluminium processing production was 3.16 million tonnes, accounting for 87.50% of Guangxi's total production and 6.02% of the country's total production. Among them, alumina production ranks fourth in the country after Shandong, Henan and Shanxi. The proportion of electrolytic aluminium and aluminium processing in the country is lower (The output of Baise city's aluminium industry's main products in 2019 is shown in the table below). In 2019, Baise city's aluminium industry and its supporting industries achieved a total output value of 128 billion yuan, accounting for approximately 59.13% of the city's total industrial output value of 216.48 billion yuan. aluminium industry became Baise City's aluminium processing capacity is growing at an average annual rate of 47%, and by 2019 Baise City will have developed an aluminium processing capacity of approximately 2.6 million tonnes. Among them, 52.27% are aluminium profiles, 19.23% are aluminium-magnesium alloy wires, 10.62% are aluminium rods, 5.79% are aluminium wires, 1.9% are aluminium plastic plates, 0.77% are aluminium-magnesium alloy wires, 3.27% are aluminium coils, 4.25% are aluminium rods and 1.9% are aluminium sheets and foils. Aluminium processing has gradually developed from ordinary building profiles to high-end building materials and to high value-added industrial profiles for transportation, aviation, electricity and electronics. The structure of the city's aluminium industry has been further optimized, and a whole industrial chain system has been formed from aluminium mining, alumina, electrolytic aluminium and aluminium processing, as well as the integrated development of supporting industries and comprehensive recycling industries. Horizontal development: Baise City's bauxite ore is not only used as a raw material for alumina production, but also gradually extended to products such as polymerized alumina, calcium aluminate, brown corundum, refractory materials and industrial porcelain balls, forming a special industry of non-metallurgical chemical alumina. Vertical development: Baise City's aluminium processing is gradually developing from construction profiles to aluminium sheet and foil, aluminium-magnesium alloy wire, aluminium wheel hubs for automobiles, aluminium cylinder heads for engines and other aluminium deep processing with higher added value.

Table1 Production of key products in the aluminium industry in Baise City in 2019

Products	Aluminium oxide (ten thousand tonnes)	Electrolytic aluminium (ten thousand tonnes)	Aluminium fabrication (ten thousand tonnes)	Products	Aluminium oxide (ten thousand tonnes)	Electrolytic aluminium (ten thousand tonnes)	Aluminium fabrication (ten thousand tonnes)
Guangxi	846	227	361	National	7247	3575	5252
Baise city	846	185	316	Baise city	846	185	316
Percentage	100%	81.50%	87.50%	Percentage of	11.67%	5.18%	6.02%

Problems in the Aluminium Deep Processing Industry

Lower Added Value of Products from the Aluminium Processing Industry

The aluminium processing industry in Baise city is based on the simple processing of resources. From the creation of Baise city's ecological aluminium industry demonstration base in 2011 to 2018, although the whole industrial chain of the aluminium industry has basically formed, aluminium processing products belong to the category of primary raw materials, with low technological content, low added value and weak market competitiveness. From the perspective of the proportion, the aluminum industry's aluminum products composition of aluminum profiles, aluminum rods and other low value-added aluminum products capacity of 2.1 million tons, accounting for 65% of the total aluminum production capacity. Rare earth aluminum enameled wire, aluminum sheet and foil, aluminum welding rod, medical aluminum instruments and other high value-added aluminum products accounted for a relatively low proportion, the production capacity of only 1.1 million tons, accounting for 35% of the total aluminum production capacity. Obviously, the proportion of such primary products of aluminum is high. The structural problem of low proportion of products with advanced finishing is prominent, and its affects the quality and efficiency of Baise city's ecological aluminum industry. aluminum products exported by Baise city are mainly aluminum profiles, aluminum sheets, aluminum strips, etc.. The added value of the products only accounts for about 20% of the cost of raw materials, and its profit is very thin. Once it is affected by the rising price of raw materials or price fluctuations in the product sales market, its profit margin will be easily squeezed and its profitability is weak. The production and export of the products will be affected and easily fall into difficulties as a result.

Low Level of Technology for Aluminium Processing Projects

The current Baise city aluminum industry is generally at the low end of the industrial chain, with a technical content. By the end of 2018, the aluminum processing capacity reached 3.2 million tons/year, accounting for about 6% of the country, with a large scale. However, aluminum processing products are mainly aluminum rods, aluminum materials, aluminum wire and aluminum boxes, with low technological content and weak market competitiveness. Relying on low-tech products as the support of manufacturing profits are offset by rising cost factors. Low profits in the aluminum processing industry make enterprises vulnerable to

difficulties. The advantages of the industry based on resource endowment are thus gradually weakened, and the development space and potential are increasingly reduced, and it is difficult to get out of the cycle of low quality and low efficiency. The lack of high technology applications for enterprises to reduce costs, high raw material costs and lack of capital, etc., so the aluminum deep processing industry can only operate at a low level.

Expanding Contradiction between Increased Energy Consumption and Insufficient Energy Targets

Despite the adoption of advanced technologies to achieve the goal of reducing energy consumption per unit of product, the total energy consumption of the aluminium industry has increased significantly. Baise City's energy consumption during the "the 13th Five-Year Plan" amounted to 9.5 million tons of standard coal, accounting for 51.6% of the 18.4 million tons of new energy consumption assigned by the State to Guangxi under the "the 13th Five-Year Plan". Among them, the aluminum industry added 7.3 million tons of standard coal, accounting for 39.7% of Guangxi's new targets. In the first three years of "the 13th Five-Year Plan", the new energy consumption amounted to 5,286,900 tons of standard coal, which exceeded 2.5 times of the new indicators issued by Guangxi to Baise city. And it was impossible to solve the energy consumption indicators and further expand the reproduction.

The Latent Contradiction between the Long-term Sustainable Development of the Aluminum Industry and the Limited Bauxite Resources

After 30 years of rapid development of the aluminium industry and the rapid exploitation of bauxite, the recoverable bauxite reserves have been reduced to around 300 million tonnes, which is only enough to sustain the existing alumina production capacity of Baise city for 10 years. As the channels for utilizing bauxite resources from abroad have not yet been opened up, the constraints of bauxite resources for the sustainable development of the base have come to the fore. Newly laid out aluminium industry enterprises, such as Baise Group's coal, electricity and aluminium integration enterprises in Tianyang, Debao and Tianlin Jiuzhou, have started construction of a new aluminium plant in Longlin. Low-end aluminium industry homogeneous expansion, although to achieve short-term aluminum industry volume expansion, but also will shorten the Baise city aluminum industry life span, "second venture" depth of development of the source faced with depletion of the situation, the future Baise The sustainable development of the aluminium industry in Baise city will be constrained.

From the above analysis, it can be found that the low value-added and technical level of aluminium deep processing in Baise city, the mutual contradiction between energy consumption and energy indicators, the mismatch between the production capacities of different links of the industry chain, the inequality of the structure and the high degree of fragmentation between links, make the distribution of industrial profits increasingly unfavourable to intermediate enterprises such as alumina and electrolytic aluminium, and hinder the sustainable development of the aluminium industry. The principle is simple. For the manufacturing industry, industrial profits are always transferred to the key links in the industrial chain, and then a reasonable profit distribution is made within the industry. The founder of Taiwan's Acer Group, Shi Zhenrong, once used the smile curve to describe the value chain of the manufacturing industry. That is, the value chain at the two ends of the value chain (research and development, design, branding, finance, etc.) produces higher added value and profitability, while the bottom end (processing, assembly, manufacturing and other traditional

manufacturing links) has low added value and profitability. Therefore, it is necessary to analyze the aluminum deep processing of Baise city to improve the efficiency.

Gray Correlation System

The natural world we live in can be seen as a large system, built up of many different subsystems. And these many different subsystems are made up of different elements, so it is important to study the interrelationship between these systems and elements. gray correlation is a mathematical model for gray system analysis, which measures the interrelation of interrelated systems and elements by means of quantitative calculations. Gray correlation analysis is based on calculus correlation theory, basic measurement theory, spatial theory and other principles of wholeness, normality and symmetry, and compares explicit and ambiguous information within an interconnected system. The degree of correlation and the correlation between the values is calculated by looking at the correlation data between the variables at each moment, thus determining the gray relationship between the parent and child series.

The main significance of gray correlation degree analysis is that it can objectively and quantitatively reflect the dynamics of changes between two factors (generally referred to as the parent series and any sub-series) in the development process of a system, i.e. if the dynamics of changes between the two are the same during the development process, it means that there is a high correlation degree between the two. And conversely, if the dynamics of changes between the two are not the same during the development process, it means that there is a low correlation degree between the two. Therefore, gray correlation degree analysis provides an objective and quantitative method for analyzing the developmental dynamics between subsystems and elements of a system, reflecting the correlation between the various factors over time .

Gray correlation analysis is the use of mathematical methods to calculate the magnitude of the interaction between factors in a certain period of time, which is expressed in terms of correlation coefficient and correlation degree. Compared with regression analysis, co-integration analysis and factor analysis, gray correlation is more systematic, accurate and reliable, overcoming the shortcomings of quantitative analysis done by models alone and directly seeking the magnitude of the influence of factors in the development process of the system. Therefore, this study uses this method to evaluate the influencing factors of deep processing in the aluminium industry of Baise city.

Basic Concepts of the Gray Correlation Method

The system behavior sequence is set to $\{Y_t | t=1,2,\dots,n\}$ and $\{X_{it} | t=1,2,\dots,n\}$, $i=1,2,\dots,m$. Y_t is the variable reference data series and X_{it} is the comparison data series.

(1) Raw data processing

The original data needs to be dimensionless prior to series analysis as the original data has a different magnitude. The main methods of de-normalization are normalization transformations, normalization methods, initial value changes and so on. The data selected for this paper are mostly stable socioeconomic growth data. Thus, the normalization method is chosen to reduce it to the number of $[0,1]$ intervals. The specific formula is as follows.

$$X'_{it} = \frac{X_{it}}{\frac{1}{n} \sum_{t=1}^n X_{it}} \quad (i=1,2,\dots,m)$$

(2) Calculation of correlation degree

The essence of correlation degree analysis is to compare the correlation between the data in the time series under study. If the data geometries of the two series at the time points under study overlap, then the correlation coefficient and correlation degree are both 1. Conversely, if the data geometry of the two series presents a vertical state at the time point under study, then the obtained correlation coefficient and correlation degree are both zero. Thus, the average of the correlation coefficients of the two compared series at each point in time can be used to represent the correlation degree of the two series. The calculation formula is as follows.

$$R_i = \frac{1}{n} \sum_{k=1}^m \xi_i(k)$$

In Eq., n is denoted as the length of the comparison sequence. The larger the value of the correlation degree number, the greater the degree of influence of the factor on the parent series.

(3) Calculation of correlation coefficient

By transforming the data, the correlation coefficient $\xi_i(k)$ between the reference series Y_t and the comparison series X_{it} at the moment $t=k$ can be calculated by the following equation.

$$\xi_i(k) = \frac{\Delta_{\min} + \rho \Delta_{\max}}{\Delta_i(k) + \rho \Delta_{\max}}$$

$\Delta_i(k)$ represents the absolute difference between the two compared sequences at the k moment. $\Delta_i(k) = |Y'(k) - X'_i(k)|$ ($1 \leq i \leq m$), $\Delta_{\min}$ and $\Delta_{\max}$ represent the minimum and maximum values of the absolute difference in each moment in all sequences, respectively. ρ is the discrimination coefficient, is to weaken the maximum absolute difference number. $\rho \in (0,1)$ is to avoid distortion caused by a large value of ρ , and also to consider the variability of different correlation coefficient, ρ is taken as 0.5 in no special case.

(4) Row correlation order

The correlation order can directly reflect the degree of influence of each child series on the parent series.

If $R_1 > R_2$, it indicates that R_1 is superior to R_2 for the parent series.

If $R_1 = R_2$, it indicates that for the parent series, R_1 is equivalent to R_2 .

If $R_1 < R_2$, it indicates that for the parent series, R_1 is inferior to R_2 .

Variable Selection and Source of Data

(1) Variable selection

A wide range of factors influence the development of the aluminium industry deep processing, and the magnitude of the impact of each factor on it varies. Based on the characteristics of the aluminium industry deep processing industry in Baise city, a series of precise indicators were selected for the study, taking into account the principles of generality, specificity concentration and importance of the indicators, combined with the desirability of the data. In this study, the total value of aluminium deep processing products processed is taken

as the reference series Y_t , while the influencing factors are selected in terms of raw materials for aluminium processing, production conditions and related supporting industries. Alumina used for deep processing, total amount of electrolytic aluminum X'_{1t} , deep processing employees X'_{2t} , deep processing capacity (ton/year) X'_{3t} , number of deep processing enterprises X'_{4t} , the enterprise size of deep processing X'_{5t} , fixed investment of deep processing X'_{6t} , and goods turnover comparison sequence X'_{7t} are selected respectively.

(2) Data sources and processing

Time series data of Baise city aluminum deep processing for the 5-year period of 2016-2020 are selected according to the purpose of the study and the design of the indicator system for data collection. The original data are obtained from "Baise city statistical yearbook", "Baise city national economic and social development bulletin". The series data are standardized according to equation (1), as shown in Table 2.

Table 2 Data on the total value of aluminum deep processing in Baise City and the factors influencing it for the period 2016-2020

Year	Y_t	X'_{1t}	X'_{2t}	X'_{3t}	X'_{4t}	X'_{5t}	X'_{6t}	X'_{7t}
2016	1.0623	0.9890	0.9921	0.8056	0.7988	1.0442	0.7240	1.0110
2017	1.0989	0.9987	1.0016	1.0443	0.8160	1.1061	1.3116	1.0394
2018	1.1231	0.9572	1.0117	1.1136	0.8994	1.1344	1.3606	0.8834
2019	1.1233	1.1312	1.0195	1.3072	0.9345	1.1730	1.4178	0.8966
2020	1.2186	1.1687	1.0206	1.3929	2.2031	1.2690	1.4038	0.9231

Measurement and Analysis of Correlation Degree

According to equation 2, the list of corresponding differences is derived. By comparison it is possible to find $\Delta_{\min} = 0.0072$ and $\Delta_{\max} = 0.9845$. $\rho = 0.5$ [2] is set in this study. The correlation coefficient of the series at each moment point is calculated and compared in order to find the correlation degree of each series. As shown in Table 3.

Table 3 Correlation Coefficient of Factors Affecting the Aluminium Deep Processing Industry in Baise City

Year	ξ_{1t}	ξ_{2t}	ξ_{3t}	ξ_{4t}	ξ_{5t}	ξ_{6t}	ξ_{7t}
2016	0.8018	0.8887	0.6647	0.6590	0.9789	0.5991	0.9199
2017	0.8326	0.8364	0.8991	0.6363	0.9879	0.6926	0.8931
2018	0.7352	0.8008	0.9578	0.6776	0.9998	0.6872	0.6636
2019	0.9847	0.8275	0.7292	0.7230	0.9098	0.6280	0.6877
2020	0.9098	0.7153	0.7395	0.3345	0.9056	0.7267	0.6268
Correlation degree	0.8343	0.7810	0.8283	0.6983	0.9508	0.6858	0.7131

The individual influences were ranked according to the magnitude of their correlation degree with the parent series as follows.

$$R_5 > R_1 > R_3 > R_2 > R_7 > R_4 > R_6$$

Overall, all indicators are positively correlated with the aluminium deep processing industry in Baise city from 2016-2020. But the magnitude of the effect varies and there is a large variation. Of these, firm size has the greatest impact on the aluminium deep processing industry. The larger the size of an aluminium deep processing company, the more efficient it is and the higher its output, and vice versa. At present, small and medium-sized enterprises in aluminium deep processing in Baise city account for a large proportion of the total number of processing enterprises, and suffer from small processing scale, outdated technology and machinery, and insufficient capital.

The size of alumina and electrolytic aluminium production and technological capacity used for deep processing is closely related to the value of aluminium deep processing output, which shows that the development of the aluminium deep processing industry in Baise city has a strong path dependence on an abundant supply of aluminium products and a strong technological innovation capacity. Among these, alumina and electrolytic aluminium play a crucial role in the processing industry as the basic production factors and starting point for processing.

The distribution of aluminium products is closely linked to the aluminium deep processing industry. The distribution of aluminium products is the driving force behind the sustainable development of the deep processing industry. In recent years, the city of Baise has increased the construction of infrastructure projects such as transport and network information, which actively create favourable conditions for the rapid distribution of aluminium products. Processing enterprises, aluminium workers and processing capacity are the conditions for the development of aluminium deep processing. Abundant labour resources and low labour costs are the driving force behind the rapid development of the aluminium processing industry in Baise city. At present, the aluminium processing industry in Baise city is still a labour-intensive industry, abundant labour resources and low labour costs are important guarantees for the development of labour-intensive industries. The aluminium processing industry in Baise city is in urgent need of an industrial upgrade.

Fixed investment is then a factor supporting the development of aluminium deep processing. From a vertical perspective, the aluminium processing industry is an intermediate industry in aluminium production and aluminium sales. And its development cannot be separated from the support of upstream and downstream industries. From the horizontal point of view, the development of aluminium processing industry is closely related to information service industry, machinery manufacturing industry, financial industry and so on. If a certain aluminium processing enterprise has a number of good suppliers and related auxiliary industries (storage, transport, etc.), it will provide important conditions for the enterprise to gain strong competitiveness. Related industries and auxiliary industries also get economic rewards in factor investment, which will spread among industries to produce "spillover effects", the result is bound to accelerate the gathering of related industries with competitive advantages, forming advantageous industry groups^[11].

**Conclusion: Baise City's Aluminium Deep Processing Path Upgrade
Local Policy Support**

In order to solve the problem of unreasonable structure of the aluminium industry in Baise City, we must strengthen the top-level system design. The advantages of Baise City's aluminium industry development should be clearly defined, and a number of large leading enterprises with high technology, large industrial correlation degree and high added value should be supported and cultivated, and then the development of small and medium-sized enterprises in related industries in the vicinity should be led by points, so as to form a situation of mutual cooperation and orderly competition among large and medium-sized enterprises in the region and form the advantages of the regional industry. Based on the current hydropower, coal and land resources and industrial development in Baise City, the relative advantages of the region are clarified through horizontal comparisons, highlighting the advantages and coordinating development to drive the development of general areas of industry by leading from the point to the surface, in order to enhance the communication and exchange between different enterprises within the region, and to bring into play the advantages of scale by means of mergers and restructuring, so as to enhance the competitiveness of the industry.

Cultivation of Leading Aluminium Processing Companies and Strengthening of Brand Building

The industrialization process was accelerated, and a number of strong and strong radiation leading aluminum processing enterprises were cultivated and developed. Aluminum product processing enterprises are encouraged to focus on independent innovation and brand building, and continuously improve product research and development capabilities in order to cultivate a number of well-known products with a high market share. In accordance with the requirements of industrialized operation, standardized production, market-oriented marketing, project-oriented operation, modernized management and socialized service, the quality and efficiency of aluminum product processing industry in Baise City are improved comprehensively.

The development and growth of leading processing companies
The aluminium processing industry in most areas of Baise city is dominated by private small and medium-sized enterprises, with problems such as fragmented operations, backward machinery and equipment, and lagging technology and management systems. In order to realize the transformation of aluminium processing to deep and high-value utilization and efficient application, the government of Baise city should innovate the management system, introduce advanced technology, encourage independent window front and cultivate large-scale enterprises. In the development of aluminium product processing leading enterprises, the government should adopt various ways such as low threshold, invite in, and give preferential policies in all aspects, and vigorously promote the process of deep processing and Baise city aluminium industrialization, in order to make Baise city aluminium deep processing achieve greater development.

Implementation of brand strategy, brand awareness and brand value
Brands play a crucial role in enhancing the overall competitiveness of products and extending their life cycle, representing the high quality of products and the trust of consumers. Baise city's government and aluminium authorities at all levels should attach great importance to the development of aluminium processing enterprises, support them in terms of policy and financial investment, guide them to establish brand awareness by creating a broad information

platform. At the same time, they should carry out a series of in-depth for the enterprise to create a brand name, focusing on the development of a number of market development ability, high level of independent innovation and radiation driven by a wide range of aluminum processing leading enterprises adhere to the quality of construction as the core, to establish high-end brands as the goal, to form mergers and acquisitions of enterprises as a way to respect the laws of the market on the basis of the role of policy guidance, in order to lead the processing of aluminum products to a new level. In addition, aluminum processing enterprises should be in the government's advocacy and guidance around the comparative advantage and characteristics of high-quality aquatic products, strict control of the production process, production of a number of high quality level of "green" aquatic products, in order to enhance product awareness and market share.

Special Support for Factors of Production

The aluminium industry is a resource-based industry, and the development of the aluminium industry cannot be achieved without the support of natural resource factors such as hydropower and coal, as well as other factors such as financial capital, infrastructure and land supply. The sustainable and stable supply of primary factors of production has a greater impact on the competitiveness of the aluminium industry. At present, these factors of production are basically in the hands of the state, and the development of the aluminium industry in Baise City cannot be achieved without the continuous supply of factors of production, which ultimately cannot be achieved without the policy support of factors of production at the government level. In the current development of the aluminium industry in Baise City, the government has provided some support in terms of land supply and taxation. But there is still a lack of financial and special funding for the development of small and medium-sized enterprises. At present, small and medium-sized enterprises still rely on themselves to solve the financial problems in the process of development, and under the current financial policy, it is difficult for some small and medium-sized enterprises to obtain a large amount of bank financing. The government should set up special funds to support the development of the aluminium industry, and give appropriate financial support to enterprises with good development prospects. On the other hand, the government should focus on improving the development of natural resources such as hydropower and coal, and reduce the cost of electricity and water for enterprises through various means. In particular, the government should improve the construction of regional power grids, so that the price of electricity used by the aluminium industry in Baise City can be balanced with that of neighbouring enterprises, thereby significantly reducing the production costs of aluminium electrolysis enterprises. At the same time, the government should also increase its support for new high-tech, high value-added and full industrial chain aluminium enterprises, so as to promote the blossoming of the Baise city aluminum industry and the upgrading of the industrial structure.

Recruitment and Development of Talents

The current competition in the global aluminium industry is in fact the competition of the level of science and technology, the competition of professional talents, the quantity and quality of high-end talents is the core competitiveness of the aluminium industry. Only when global high quality and large professional talents are brought together, high level scientific and technological achievements can be transformed out and industrial upgrading and restructuring can be promoted. The improvement of aluminum industry's scientific and technological

innovation ability must adhere to the people-oriented thinking, and build an atmosphere of scientific and technological innovation that is really attentive to talents, retains them and promotes their development. At the same time, under the active guidance of Baise City government, a good environment of daring to innovate and not afraid of failure needs to be formed within the industry. Baise City implements a talent strategy that combines the independent cultivation of talent with external introduction.

Introduction of specialized talents from outside the industry

After the weak links of Baise City's industrial development are combined, high quality and high level of enterprise management talents and scientific and technological innovation talents should be introduced within the enterprise. Cooperation with well-known domestic research institutes should be promoted and high-tech talent studios should be established separately to attract the presence of academician-level and professor-level teams, thus enhancing the technical level and innovation capacity of Baise City industry as a whole. A series of measures should be taken to introduce high-level researchers from overseas, which can be introduced through international exchange organizations, diplomatic departments of the country and international industrial associations.

Autonomous training of human resources within the industry

In the current tense international situation and technological blockade, it is difficult to rely solely on the introduction of external expertise. Companies should pay attention to the training and learning of their internal personnel and make use of talent resources to improve their own quality. The company should focus on training management personnel in the top management, technical backbone in the production team and innovative personnel in the R&D team to build a system of internal talent training to prevent a talent gap. The industry-university-research model should be adopted to combine science and technology innovation with enterprise production, promote science and technology research and development through enterprise production, and feed enterprise production through science and technology research and development.

Promotion of the integration of industry-university-research

Baise City aluminium enterprises should actively use all the social resources available to them to promote the level of science and technology within the enterprise and improve their competitiveness. In accordance with the government's scientific and technological development requirements, we should adhere to the open road of scientific and technological innovation. And we should constantly strengthen cooperation with well-known domestic research institutes and renowned universities and other institutions with strong scientific and technological innovation capabilities and core technologies. The industry-university-research model should be adopted to combine science and technology innovation with enterprise production, promote science and technology research and development through enterprise production, and feed enterprise production through science and technology research and development. At the same time, enterprises for the scientific research results and more mature technology should be as soon as possible to transform scientific research results and industrialization, science and technology into productivity and business benefits, in order to improve the competitiveness of the market, and promote enterprises to achieve "outperforming the competition". First of all, we should strengthen the cooperation with domestic famous research institutes and famous universities and other institutions with strong scientific and technological innovation ability and core technology. From a global perspective, renowned universities and research institutes are an important force in promoting scientific and

technological development. Baise City government enterprises are invited to make use of the scientific and technological resources of research institutes and universities, to work closely with the strategic objectives of the enterprises, to develop active cooperation in fundamental and forward-looking areas of the aluminum industry, and to adopt the method of cooperation between enterprises and research institutes and universities to jointly build state key laboratories, giving full play to the theoretical advantages of higher education institutions and the practical advantages of enterprises. A series of technical problems are jointly tackled to form a layout of internal and external resources that are mutually open and shared in terms of science and technology resources. The scientific and technological innovation resources of both sides are used wisely to promote the scientific and technological level of China's aluminium industry. According to the strategy of Baise City aluminium industry to actively expand overseas markets, the direction and goal of development should be clearly defined, and the main goal of conducting international cooperation should be put to the goal of improving the scientific and technological level for the company. It is important to try to build workshops and laboratories with renowned overseas universities and research institutes and to train high-technology personnel, thus promoting a deeper cooperation between Baise City companies and major overseas research institutes and universities. It is also important to strengthen cooperation with world-renowned multinational companies to learn from their advanced corporate management concepts and scientific and technological systems to make up for the shortcomings and deficiencies of Chinese companies in terms of technology and management systems. International cooperation and exchange must be strengthened in order to transform high-level scientific and technological achievements and promote the upgrading and restructuring of industries.

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