

Study on the Development Strategy of China Rare Earth Industry

-- Take Northern Rare Earth Group as an Example

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Abstract

Rare earth resource is an important non renewable strategic resource in China. It is known as "industrial vitamin". It is an indispensable assistance for the development of new energy, medical devices, aerospace, military industry, petrochemical and other high-tech industries. Taking the North rare earth group as an example, this research analyzes the political, economic, social and technological macro environment, advantages and disadvantages, opportunities and threats faced by China's rare earth industry in trade by using PEST analysis method and SWOT analysis method. Through the above analysis, it is found that there are some problems in the development of rare earth industry in China such as environmental pollution, unreasonable industrial structure, Insufficient innovation and so on. The strategy of ecological and social environment governance, the strategy of structural adjustment and the strategy of talent reserve for scientific and technological innovation are put forward.

Keywords

Rare Earth; Strategic Management; SWTO Analysis.

1. Introduction

Rare earth resource is an important nonrenewable strategic resource in China. It is the general name of 17 metal elements and their compounds, including lanthanum (La), cerium (Ce), praseodymium (Pr) and so on. It is known as "industrial vitamin" and "industrial monosodium glutamate". It is an indispensable support for the development of high-tech industries such as new energy, medical equipment, aerospace, military industry, petrochemical industry, etc. China's rare earth reserves and output rank first in the world, and its exports and consumption also rank first in the world, which supplying nearly 90% of the world's rare earth resources. According to the data of the General Administration of Customs of China, the export of rare earth products in 2021 will be 48900 tons, an increase of 38% compared with 3.54 tons in 2020. The export volume in 2021 will be 609 million dollars, an increase of 77.12% year on year. In terms of export products, China's rare earth exports are dominated by rare earth compounds. In 2021, 39500 tons of rare earth compounds will be exported nationwide, accounting for 80.71% of the total exports; The export of rare earth metals was 9400 tons, accounting for 19.29% of the total export volume. China's rare earth exports are largely exported at low prices all the year round, and it is normal for the quantity to increase and the price to decrease. China North Rare Earth Group is one of the six largest rare earth groups in the country's rare earth industry founded in 1961. After more than 50 years of development, North Rare Earth has become a trans regional, trans ownership and trans domain high-tech enterprise group with more than 43 branches, wholly-owned, holding and joint-stock companies. It is the largest rare earth production, scientific research and trade base in China and the world. It has built a complete industrial chain of rare earth beneficiation, smelting and separation, functional materials, and deep processing and application. Its products are well known at China and abroad, Among them, rare earth products of raw materials have gained a leading position in the market. Strategic

management is the overall long-term development goal, direction and policy of an organization or enterprise in a certain period. This paper uses PEST analysis method and SWOT analysis method to analyze the political, economic, social, technological and other macro environment, advantages and disadvantages, opportunities and threats faced by China's rare earth industry in trade, which is helpful to select targeted strategic decisions, so as to ensure the sustainable development of rare earth industry.

2. Literature Review

2.1. Foreign Research

In 1962, Chandler put forward the famous assertion “organization is subordinate to strategy” in his *Strategy and Structure* book. He defined strategy as “determining the long-term basic goals and objectives of the enterprise, selecting the ways that the enterprise will follow to achieve these goals, and managing the important resources of the enterprise to achieve these goals and approaches”, which laid a foundation for the systematic study of strategic management theory (Chandler, 2002). In recent years, the competition of rare earth industry in the world has been fierce, and various countries have adopted different rare earth strategic management. The United States released its key mineral strategy, held various policy hearings on key minerals such as rare earths, and recently adjusted its key mineral strategy. The main contents are to protect the national and mineral resources security of the United States, speed up the examination and approval of the mining environment, strengthen cooperation with allies to enhance supply flexibility, strengthen geological exploration of key minerals and other strategic measures, so as to ensure the continuous development of its high-end downstream technology (Goldman, 2014). Eva founded that the EU also released a report on key mineral raw materials. In terms of the supply and development of rare earths, they invested in scientific research on the recycling of rare earths to strengthen the supply of different countries. The strategy of countries around the world in rare earth industry is to increase the diversification of rare earth supply, increase the strategic reserve of mineral resources, and restart mineral development to reduce the import volume of their own demand (Eva et al. 2016). ZH ü, k et al. provided an ANP-SWOT method for the over exploitation of China's rare earth industry, which is used for the interdependence analysis and prioritization of China's rare earth industry. By analyzing the internal and external environmental factors, five short-term strategies and four long-term strategies were formulated to determine the optimal strategy for the development planning of rare earth industry. The results show that the best short-term development strategy of China's rare earth industry is to protect key resources and integrate mining rights, and the best long-term strategy is to establish a national strategic reserve system for rare resources and improve technological innovation capabilities (Zhu, et al. 2016).

2.2. Domestic Research

Liu Yiqing took Jiangxi Province, an important rare earth production base in China, as an example, and based on Porter's “diamond model”, built a theoretical basis related to competitiveness research, comprehensively and deeply expounded their competitive environment, analyzed the problems and causes of Jiangxi's rare earth industry development, and proposed development countermeasures (Liu Yiqing, 2012). Tan Jiyu took the relevant national policies during the “13th Five Year Plan” period as the guidance, took the sustainable development of the rare earth industry as the goal, carried out research on the industry problems exposed in the development environment of the rare earth industry, sought solutions to the existing problems, and put forward targeted strategies for the supply side reform of the rare earth industry (Tan Jiyu, et al. 2015). Li Dan analyzed the development of rare earths in the north, bringing reference to standardize the healthy development of the whole rare earth industry and form a rare earth industry pattern focusing on the development and application

of new rare earth materials (Li Dan, 2017). Cui Chen started from the core competitiveness to analyze and study the core competitiveness of the rare earth industry in the north and seek good strategies for the future development of the rare earth industry (Cui Chen, 2020). Li Huiqian and others also put forward suggestions on increasing the development of rare earth new material industry to permanent magnetic materials, hydrogen storage materials, polishing materials and light-emitting materials in the future according to the latest national policies and industry trends (Li Huiqian 2017). Hu Yingyan carried out an empirical analysis on Ganzhou rare earth enterprises. Using SPSS analysis software, they concluded that the environmental protection level still needs to be improved and the production capacity consumption is on the high side, providing new ideas for the future development of Ganzhou rare earth enterprises (Hu Yingyan, 2018). Wang Kairong analyzed the status quo and development situation of China's rare earth industry, and discussed the scientific path of high-quality development of rare earth (Wang Kairong, 2019).

According to research at home and abroad, it can be found that the rare earth industry is highly competitive. Countries have adopted various rare earth strategic management and issued different strategic decisions for strategic deployment of the rare earth industry. China is the world's largest producer of rare earths, with large resource reserves and complete varieties. However, due to the non renewable nature of rare earths and the environmental pollution caused by the development and smelting of rare earths, in order to ensure that the rare earth industry can achieve sustainable and healthy development, how to take targeted strategic decisions from multiple perspectives has become the key.

3. Analysis of the Status Quo of Rare Earth Industry

3.1. PEST Analysis

3.1.1. Political Environment

The rare earth industry is an advantageous industry highly concerned by the state. In order to make the rare earth industry bigger and stronger, the state has intensively issued a number of industrial policies, and Inner Mongolia Autonomous Region and Baotou City have also issued a number of special policies on rare earth.

1) Since the promulgation of Several Opinions of the State Council on Promoting the Sustainable and Healthy Development of the Rare Earth Industry in 2011 and the Rare Earth Situation and Policy in China (White Paper), the strategic positioning of the rare earth industry has been further clarified, and the rare earth industry has intensively issued a number of guiding policies to regulate the development of the industry.

2) At present, China "1+5" rare earth group pattern has basically taken shape. Six key rare earth companies have summarized most of the 23 rare earth mines nationwide and 54 of nearly 60 smelting and separation companies, forming a rare earth production base mainly in Baotou, Inner Mongolia, Ganzhou, Jiangxi, Liangshan, Sichuan, Longyan, Fujian, etc.

3) The government supervision was further strengthened. The Ministry of Industry and Information Technology of the People's Republic of China set up a rare earth office and a China rare earth industry association, and successively introduced and implemented a number of management systems such as the total amount control plan for rare earth mining and production, environmental protection verification, special invoices, strategic reserves, resource taxes, and product traceability system, which provided an important guarantee for the sustainable and healthy development of the rare earth industry.

4) On May 20, 2019, when President Xi Jinping visited Ganzhou, Jiangxi Province, he emphasized that technological innovation is the lifeblood of enterprises. Only by owning independent intellectual property rights and core technologies can we produce products with

core competitiveness and remain invincible in the fierce competition. We must firmly grasp the strategic basis of technological innovation, master more key core technologies, and seize the commanding heights of industry development. This points out the direction for the future development of rare earth industry.

3.1.2. Economic Environment

- 1) At the beginning of the 13th Five Year Plan period, the global economy became stable, and China's macro-economy continued to grow steadily at a rate higher than the global average.
- 2) China's economy has entered a period of structural adjustment as a whole, supply side reform, and multi industry development transition. It has become the industry consensus to comprehensively improve the quality of development and cultivate new drivers.
- 3) The world has entered a period of innovation agglomeration and the accelerated growth of strategic emerging industries. In the critical period of accelerating the cultivation and development of strategic emerging industries in China, the rare earth industry is breeding huge market demand.
- 4) The capacity of foreign rare earth industry is gradually released, and the supply of rare earth resources will form a diversified pattern. The increase in supply will have an impact on the global rare earth market, and the competition in the rare earth industry will intensify in the future.

3.1.3. Social Environment

- 1) The environmental protection efforts are unprecedented, the environmental protection level of the whole industry continues to improve, the environmental protection investment of the whole industry continues to increase, the environmental protection verification and special supervision are carried out, and the northern rare earth has invested heavily in environmental protection, with remarkable environmental protection achievements.
- 2) "Made in China 2025" and "Industry 40" bring important development opportunities for new materials, new energy and green environmental protection industries.
- 3) The "Hubao Eyu" urban agglomeration development plan was approved by the State Council. It is of great and far-reaching significance for the regional supply side structural reform, promoting the quality reform of economic development and the coordinated development of industries.
- 4) Baotou City strives to build a "rare earth valley", vigorously develops the rare earth industry as a characteristic industry of Baotou City, and has many policies to guide and encourage the development of the rare earth industry of Baotou City and create a new business card of "rare earth city".

3.1.4. Technical Environment

- 1) Many rare earth new material patents are still monopolized by the United States, Japan, Western Europe and other countries, and China is relatively weak in technology development.
- 2) In the field of rare earth smelting, China has a large shortage in the equipment level of separation and extraction, metal and other processes, such as online monitoring, automatic control, etc. There is a lack of professional advanced equipment support in rare earth industry, and many equipment are still copied from other industries.
- 3) Some rare earth materials continue to seek the technical route of rare earth element reduction.
- 4) The proportion of high-end rare earth products with high added value, high profit margin and high technology is still low.

3.2. SWOT Analysis

Table 1. SWOT analysis of Northern Rare Earth Group

Internal Conditions	<p>Strength (S)</p> <ol style="list-style-type: none"> 1. Stable demand of rare earth market 2 Inner Mongolia government promotes the development of rare earth industry 3. Fully control the light rare earth resources in the north 4 The development and application of rare earth resources are supported by national policies 	<p>Weakness(W)</p> <ol style="list-style-type: none"> 1. The development and utilization rate of mineral resources is low, the problem of rare earth overcapacity is prominent, and a large number of mining areas generally have the problems of mining rich to abandon poor, and mining is easy to abandon difficult 2. Environmental pollution 3. Inadequate innovation and R&D capability 4. It is unreasonable that the industrial structure is dominated by rare earth raw materials, and there is a lack of high value-added related processing products
External Conditions	<p>Opportunity (O)</p> <ol style="list-style-type: none"> 1. National and government support policies for rare earth industry 2. The downstream industry of rare earth has huge application space and high added value 3 Rare earth is an important resource for national economic development 	<p>Threat (T)</p> <ol style="list-style-type: none"> 1. Consumers such as the United States and Japan hold the rare earth market, and China's rare earth international competitiveness is poor 2. The risk of being replaced by rare earth production enterprises in other countries only by primary processing and resource advantages

Based on the SWOT analysis in the above table, North Rare Earth Group can fully rely on its internal advantages and take advantage of external opportunities, namely, the SO strategy, to vigorously explore the high-tech potential of rare earth enterprises, promote the transformation and upgrading of rare earth industry, and improve the status of rare earth resources in the national strategic reserve resources under the background of "Made in China 2025" and other national policies. Realize the sustainable development of rare earth, adjust the proportion of import and export of rare earth and its products, increase the innovative production and export of high value-added products, and improve the status of China's rare earth export; Or take advantage of internal advantages, avoid external threats, namely ST strategy, pay attention to the introduction of rare earth talents and the construction of rare earth R&D team, increase scientific research investment, combine the manufacturing industry to develop new rare earth materials and terminal application products, improve the proportion of new materials and terminal applications in China's rare earth consumption, and enhance the competitiveness of China's rare earth groups in the market competition; Or take advantage of external opportunities to make up for internal disadvantages, namely WO strategy, and strengthen the rectification of rare earth industry and import and export, so as to effectively protect China's rare earth resources and reduce environmental pollution. Control the exploitation and smelting separation of rare earth by the six major rare earth groups, so as to improve the phenomenon of overcapacity; Reduce internal disadvantages, avoid external threats, namely WT strategy, enhance China's awareness of the importance of rare earth resources, improve the strategic reserve system of rare earth resources, and promote the sustainable development of rare earth industry. Strengthen the crisis awareness of the

diversification of rare earth resources, control the export volume of rare earth in China, and improve the position of China's rare earth industry in international competition.

4. Strategic Recommendations

4.1. Actively Implement Environmental Protection Governance and Promote Green and Sustainable Development of Rare Earth Industry

The reserves of rare earth in China have declined seriously after a large number of mining in the past decades, which has also caused serious environmental pollution problems. The rare earth mining itself will cause damage to the environment, and the waste water and slag produced in the smelting and separation stage are also the source of environmental damage. In this regard, China should formulate and improve the laws and regulations related to environmental protection, and use stricter environmental protection laws to protect the local environment of rare earth mining from pollution. In addition, we will formulate strict operating standards for rare earth enterprises, evaluate rare earth enterprises, and implement the principle of "whoever pollutes the rare earth production shall govern, whoever damages the environment shall repair", so as to enhance the responsibility of enterprises to protect the environment. Finally, efforts should be made to improve the technology of rare earth mining from mining and smelting separation. Use modern and mechanized equipment for mineral exploitation, improve rare earth smelting and separation technology, enhance the recycling of waste water and tailings, improve the utilization rate of resources, and promote the green and sustainable development of rare earth industry.

4.2. Vigorously Extend the Rare Earth Industry Chain and Promote Industrial Structural Reform

The current rare earth industrial structure in China is very unreasonable. Smelting, separation and primary products account for the majority of domestic rare earth production, while the application of new materials and the R&D and application of terminal products are relatively backward. The state should encourage and support rare earth enterprises to extend their production lines. They cannot be satisfied with the smelting and separation of rare earth and the processing of primary products. They should develop in the direction of high core technology, high-end rare earth application and high added value, and vigorously extend the rare earth industry chain. The enterprise should increase the research and development of rare earth, strengthen the integration with the market, actively promote the research and development of more application products that meet the market demand, further increase the proportion of rare earth functional materials and their extension products in the company's sales revenue, increase the added value of products, maximize the value of rare earth, and promote the structural reform of the industry.

4.3. Promote Industrial Upgrading through Technological Innovation to Achieve High-Quality Development of Rare Earth Industry

China is a big country of rare earth, but it is not a strong country of rare earth research and development. As an extremely important strategic resource, rare earth is far from enough to rely on simple protection measures alone. It must be further developed to fully explore its value, so as to achieve high-quality development of rare earth industry. First of all, we should increase scientific research investment in the core technology fields such as new rare earth materials and rare earth components. Specifically, we should strengthen the independent innovation ability of rare earth enterprises by increasing financial support for rare earth scientific research institutions, and learn from developed countries' deep processing of primary rare earth products to complete China's independent innovation in the deep processing of rare earth products. In addition, efforts should be made to cultivate talents in rare earth scientific research

and innovation through the mechanism of cooperation between enterprises and universities. Rare earth enterprises and universities should jointly establish scientific research and innovation laboratories. University professors and enterprise technology leaders should jointly take charge of the laboratories. The talent reserve in rare earth can be enhanced through the training of undergraduate, graduate and doctoral students in universities.

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