

Analysis of the Current Situation, Problems and Countermeasures of China's Petrochemical Industry

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Abstract: The petrochemical industry is a pillar industry of China's national economy, which is related to people's food, clothing, housing and transportation. At present, China's petrochemical industry is large in scale and developing at a fast pace. However, influenced by epidemics and geopolitics, the petrochemical industry is operating under increased pressure. This paper starts from the current situation of China's petrochemical industry, analyses a series of problems that exist in the development process of China's petrochemical industry, and proposes corresponding solutions. The current industrial structural contradictions in China's petrochemical industry are so prominent that it is difficult to meet the needs of key national construction projects. At the same time, the long-standing problem of industry monopoly is not conducive to fair competition in China's petrochemical market. In addition, the petrochemical industry needs to reverse the inherent prejudice of serious environmental pollution and frequent safety accidents in the minds of the people. Therefore, accelerating the upgrading and optimisation of traditional industries, appropriately deregulating the market, adhering to green and low-carbon development and establishing a sound safety management system can effectively solve the current difficulties faced by China's petrochemical industry.

Keywords: China, petrochemical industry, problem, solution

1. Introduction

As an important part of China's manufacturing industry, the petrochemical industry is of great significance in promoting the high-quality development of China's economy. During the "13th Five-Year Plan" period, China's petrochemical industry as a whole has maintained a high development rate. Through continuous adjustment and optimisation of industrial structure, China's petrochemical industry has made many achievements in alleviating overcapacity and improving the level of scientific and technological innovation. The "14th Five-Year Plan" period is a critical period for China to leap from a large petrochemical country to a strong one, and China's petrochemical industry is bound to face new difficulties and challenges. This paper will discuss the main problems in the development of the industry and propose corresponding solutions from the current situation of China's petrochemical industry.

2. Current Situation

The petrochemical industry is an industry that uses oil and natural gas as raw materials to produce petroleum products such as gasoline, paraffin, diesel, lubricants and other petroleum products such as basic organic chemical raw materials and three major synthetic materials. Through the continuous exploration and selfless dedication of generations of Chinese people, China has developed from a backward and poor country at the beginning of its founding to become the world's second largest producer and consumer of petroleum and chemicals. Today, the petrochemical industry has become an important pillar of the national economy, with wide product coverage and huge capital and technological investment. It plays an important role in stabilising economic growth, improving people's lives and ensuring national defence and security.

In 2022, China faces the biggest change of the century as well as the global epidemic. At the same time, geopolitical risks escalated steeply and international oil and commodity prices rose sharply, and downward pressure on the domestic economy grew. In such a severe situation, China's petrochemical industry still maintains a stable operation, the industry's overall benefits are good, and the market operating environment for enterprises improves. In the first half of this year, the industry's above-scale enterprises achieved business income of 8.13 trillion yuan, an increase of 20.9%; achieved total profits of 752.12 billion yuan, an increase of 24%; the industry's total imports and exports of US\$ 515.72 billion, an increase of 28.6% [1]. All of these figures exceeded expectations, showing that the petrochemical industry has made an important contribution to our country's economic development.

At present, in the face of the new situation and new challenges, China has put forward new high-quality development requirements for the petrochemical industry. On April 7, the Ministry of Industry and Information Technology and six other ministries jointly issued the Guidance on the 14th Five-Year Plan to Promote the High-quality Development of the Petrochemical Industry. The document points out that by 2025, China's petrochemical and chemical industry has basically formed a high-quality development pattern with strong independent innovation capability, reasonable structure and layout, green safety and low carbon. At the same time, the ability to guarantee high-end products will be significantly improved, and the core competitiveness will be significantly enhanced [2].

The economic operation of China's petrochemical industry insists on "seeking progress in stability". The word "stable" refers to the industry-wide focus on establishing a stable supply chain and capital chain to ensure the efficient operation of enterprises. At the same time, the focus should be on the safety of production, and not to neglect safety issues because of excessive pursuit of production efficiency. The "Progress" refers to the need to improve the core competitiveness of the whole industry, accelerate the transformation and upgrading of the traditional industrial structure, while continuously stimulating the vitality of market players. In addition, in accordance with the requirements of the National 14th Five-Year Plan, the petrochemical enterprises should accelerate their green transformation, seize the major opportunity to develop new energy and new materials, and contribute to the national "double carbon" strategy.

3. Basic Review

China's petrochemical industry began to develop at the beginning of the founding of our country and has undergone a long and difficult struggle, which is divided into four historical stages by the China Petroleum Encyclopedia. The first was the recovery and development phase, the first oil joint venture between China and the Soviet Union was signed in March 1950. In April of the same year, the first National Petroleum Industry Conference was held, and the General Petroleum Administration was established and responsible for the production and construction of the petroleum industry in the new China. The second is the historic transformation phase, China began a comprehensive geological survey in 1955 and the self-sufficiency rate of petroleum products reached 97.6% in 1965, so that the

Chinese people no longer needed to rely on foreign oil imports. The third was a new phase of emergence, from 1966 to 1978, when the country's crude oil production grew at a high rate, easing energy supply constraints and starting to export crude oil to countries such as Japan. The fourth is the new era of development. China established the China National Offshore Oil Corporation in 1982, the China National Petroleum & Chemical Corporation in 1983 and the China New Star Petroleum Company Limited in 1997, and each company working in unison and developing together [3].

There are also many scholars who have conducted relevant studies on the current situation and problems of the petrochemical industry in China. Wu Jia Chen believes that as an important national economic foundation and pillar industry, China's petrochemical industry has generally developed well in recent years and has achieved a number of major scientific and technological innovations in key areas. However, the industry still faces many problems, for example, the dual competition in domestic and international markets is always very fierce, while the competitiveness of products in the domestic petroleum industry is low and the level of international operation of enterprises still needs to be improved [4]. Zhu Fang and Fan Min believe that in terms of costs, China's petrochemical industry suffers from a heavy tax burden, rapid rise in labour costs and difficulties in financing. In terms of the import and export environment, China imposes high tariffs on natural rubber imports and has unreasonable export tax rebates on chemical products. At the same time, due to high capital costs and difficulties in approval, the innovative R&D capability of enterprises needs to be improved. In addition, the relevant policies and regulations are not perfect, leading to chaotic market order as well as waste of resources [5].

4. Problem

4.1. Lack of Marketization

China's petrochemical industry involves a large number of enterprises, and the competition among existing competitors in the industry is relatively fierce. Data shows that in 2021 the number of petroleum and chemical enterprises above the scale in China was 26,900, achieving a business income of 14.45 trillion yuan and a total profit of 1.16 trillion yuan, both of which hit a record high. However, it cannot be ignored that there is a serious problem of monopoly of state-owned enterprises in China's petrochemical industry, which was born out of the previous planned economy system. Currently, the two leading companies, Sinopec and PetroChina, have a 19% and 17% market share in the petrochemical industry respectively. And they have for many years held a strong monopoly over the main market, including oil and gas extraction as well as fuel and gas supply. However, such a monopoly is undoubtedly very detrimental to the overall marketisation of China's petrochemical industry. It has been proven that in the context of this administrative monopoly, the two leading enterprises lack a sense of efficiency and other enterprises lack a sense of competition, while the reduction in per capita welfare is not conducive to the creation of value by the employees of the enterprises, resulting in the relatively poor international competitiveness of China's petrochemical industry, and the gap with foreign enterprises in the areas of operational capability, technological innovation and management efficiency has also become significantly wider.

4.2. Structural Contradictions in Industry

From an industry-wide perspective, the industrial structure of China's petrochemical industries is mainly concentrated at the low-end level, including crude oil, natural gas and chemical mining industries, basic raw material processing industries and general manufacturing industries. While high-end manufacturing and strategic emerging industries account for a very low proportion, and the phenomenon of homogeneity is serious. Although the industry-wide efforts to eliminate backward production capacity and restructuring have achieved significant results during the past 13th Five-Year

Plan period, China's petrochemical industry is still facing the problem of "surplus of refined oil products and shortage of new materials and specialty chemicals". It not only creates overcapacity, but also compresses the profit margin of the industry, making the Chinese petrochemical market even less competitive in the international market. At present, the structural contradiction of China's petrochemical industry has become the biggest bottleneck to leap towards a strong petrochemical country.

4.3. Environment Pollution

With the rapid economic development and the continuous deterioration of the global environment, people are becoming increasingly concerned about the use of resources and aware of health risks. At the same time, the petrochemical industry, as a major source of energy consumption and waste emissions, has led to environmental problems that have received increasing attention from all sectors of society. Generally speaking, the pollution of the petrochemical industry to the environment is mainly reflected in three aspects: wastewater, waste gas and solid waste emissions. In order to effectively solve these problems, in recent years China has set strict management requirements for the production and use of chemical products as well as the discharge of pollutants. However, in general, China has not yet carried out systematic investigation of chemical substances in production and use, environmental risk assessment and control, and the relevant legislation and systems have not yet been perfected, which leads to enterprises lack the motivation to improve [6]. In order to promote sustainable development, countries around the world are accelerating the promotion of new energy sources, which will undoubtedly have an impact on the petrochemical industry and prompt its green transformation.

4.4. Frequent Safety Accidents

The petrochemical industry is the mainstay of China's economic construction, and most of the energy consumption in China's pursuit of sustained economic growth relies on the energy replenishment created by petrochemical enterprises. However, due to the unique nature of the petrochemical industry, there are many unpredictable safety hazards in the process of production and operation, and these hazards are irreversible when they occur to society. For example, leakage of petrochemical products can not only cause energy waste and property damage, but also lead to pollution of the environment and can even affect people's health. With the continuous development of modern society and economy, the current mode of social and economic development has put forward higher requirements for the safety production in the petrochemical industry, and our country has accordingly introduced many relevant systems and standards during the operation of petrochemical enterprises. However, in recent years there have still been various safety accidents, mainly including two aspects of natural disasters and human operational errors. And the main reasons for the occurrence of risks due to human factors are the excessive pursuit of production efficiency by companies and the negligence in the processing process, as well as the lack of safety awareness among company managers and operators [7].

5. Solutions

5.1. Market Deregulation

In order to improve the situation of reduced efficiency and social welfare brought about by the administrative monopoly of the industry [8], it is necessary to continuously promote reforms to establish a fair, effective and transparent market competition pattern in the oil and gas industry. On the one hand, the petrochemical industry should be based on a market system as the fundamental

system, where every enterprise is provided with free and equal access to the market and the government is not able to interfere too much with prices and production within the industry but can provide appropriate subsidies and regulation for some inherently high-risk projects. On the other hand, the legal and judicial anti-monopoly regime continues to be improved. The Annual Report on Antitrust Enforcement in China (2021) mentions that the chemical industry has always been the industry with the highest number of antitrust cases filed over the years, but with the continuous implementation of the antitrust law, the total amount of transactions involved in the cases is gradually decreasing, which shows that antitrust enforcement should continue to focus on the market conduct of large petrochemical enterprises, resolutely resist unfair competition and maintain market order.

5.2. Upgrading and Optimisation of Traditional Industries

Although China's petrochemical industry has achieved a series of high-level innovations in recent years, there is still a large gap between the innovation capacity of China's petrochemical industry and that of the world's powerhouses from a general perspective. Therefore, in the new era, China's petrochemical enterprises must change their obsessive pursuit of production scale and speed, then shift to high-quality of development. The industry needs to concentrate all its strengths, focus closely on domestic market demand and the needs of major projects such as aerospace, and step-up efforts to cultivate high-end manufacturing and strategic emerging industries. At the same time, the most crucial point is to improve the innovation ability of enterprises, especially to improve the level of innovation and research in high-end fine chemicals, new chemical materials, new chemical energy and other high-end fields. Only through continuous innovation can we strive to overcome the shortcomings of "neck" technology and comprehensively enhance the supply capacity of the high-end industrial chain [9].

5.3. Adherence to Green and Low-carbon Development

In September 2020, China proposed to strive to reach the carbon peak by 2030 and achieve carbon neutrality by 2060. In the 14th Five-Year Plan period, China's implementation of the dual carbon strategy has become clearer and more experienced, providing the petrochemical industry with more correct strategic guidance and more specific methodological guidelines. On June 5, PetroChina released the PetroChina Green and Low Carbon Development Action Plan 3.0, which is dedicated to accelerating the reduction of greenhouse gas emissions. PetroChina has divided its green and low-carbon development action into three stages: clean alternative, strategic succession and green transformation, hoping to lead more petrochemical companies to achieve green and low-carbon transformation development and contribute to the fight against global climate change [10]. While continuously deepening comprehensive pollution control and building a green chemical industry, the petrochemical industry should actively promote environmental information disclosure, regularly release environmental information disclosure reports and consciously assume social responsibility.

5.4. Establish a Sound Safety Management System

To achieve the minimum possible number of safety accidents in the petrochemical industry, the joint efforts of the state, enterprises and individuals are needed on many fronts. First, the state needs to develop effective safety management measures for hazardous chemicals and strengthen risk assessment and management legislation in the chemical sector. National security departments should strengthen their supervision of the safety improvement process of petrochemical enterprises to prevent accidents before they occur. Petrochemical enterprises should establish a sound corporate safety management system. The HSE management system is currently the most widely used management concept in petrochemical enterprises. It is a management method that takes risk pre-

control as the core and follows the cycle of Plan, Do, Check and Action to achieve its continuous development. In order to better implement and enforce the HSE management system, the leadership of the company needs to identify and deal with hidden dangers in a timely manner, as well as to strengthen the audit of risk control to achieve dynamic risk management. All departments in the company will integrate their HSE responsibilities with their work duties and implement the division of labour between the elements of the HSE management system. In addition, enterprises should also focus on improving the safety culture of all employees, regularly carry out safety operation skills training, and continuously improve the HSE work incentive assessment mechanism to fully mobilise the enthusiasm of employees [11].

6. Conclusion

As an important economic foundation of the country, China's petrochemical industry has been developing well in recent years, with high growth in economic benefits. During the 14th Five-Year Plan period, China's petrochemical industry will continue to maintain a stable development quality and a fast development speed. In this paper, we analyze the current status of the Chinese petrochemical industry to discover the potential problems. The administrative monopoly of leading enterprises leads to the lack of reasonable competitive market environment in petrochemical industry. The overcapacity of low-end products and the shortage of high-end products have become a fundamental constraint to the high-quality development of the industry. The waste discharge and energy consumption in petrochemical production has enormous pressure on people's living environment. Frequent safety accidents seriously threaten people's health. Therefore, in the face of these potential problems, the country, enterprises and individuals should work together to actively take measures. Deregulating the market, accelerating the upgrading and optimisation of traditional industries, adherence to green and low-carbon development, establishing a sound safety management system are relatively effective solutions to improve the comprehensive competitiveness of China's petrochemical industry.

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