

AI Technology Promotes the Effective Development of Chemical Enterprises

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Abstract: At present, subject to the overall sluggish economic environment, various industries have generally suffered a severe test. The chemical sector, in particular, has been hit hard by the multiple pressures of tightening demand, slowing economic growth and falling profitability. However, the rise of artificial intelligence has brought positive effects to the development of the chemical industry. With the continuous progress of artificial intelligence technology in recent years, it is not only used to reduce labor costs and shorten working time, but also shows broad application potential in deeper applications such as intelligent operation, design assistance, and data modeling. This paper first summarizes the current predicament of China's chemical industry, and then discusses some problems existing in the development of chemical enterprises. Finally, this paper will discuss how to optimize the planning process of chemical enterprises, simplify production links, strengthen production management and improve the intelligence of operation processes, to study the specific impact of artificial intelligence platform on enhancing the competitiveness of chemical enterprises, in order to promote the transformation of China's chemical industry to high-quality development.

Keywords: Artificial intelligence; chemical industry; intelligent promotion.

1. Introduction

With the continuous innovation of the Internet, big data and artificial intelligence information technology, the phenomenon of chain reaction has gradually emerged in our society. This phenomenon mainly refers to the common effect of various fields in society, driven by a certain factor such as economy or science and technology [1]. For example, scientific and technological progress has promoted the maturity of domestic manufacturing technology, which has not only promoted the synchronous growth of the automobile, digital products and furniture manufacturing industry, but also led to the prosperity of the related industrial chain. However, in recent years, adverse factors such as economic depression and disease epidemics have made several industries,

including the traditional chemical industry, face challenges. Although China's traditional chemical enterprises have a relatively complete foundation for development, factors such as technology lag, outdated equipment and staff professional skills limit the further improvement of enterprise capabilities. In this context, the introduction of artificial intelligence has had a significant impact on traditional chemical enterprises. Artificial intelligence technology realizes the intelligent control of machines and systems through the Internet, cloud computing and other means, and plays an important role in processes such as chemical enterprises.

2. The Current Development Situation of China's Chemical Industry

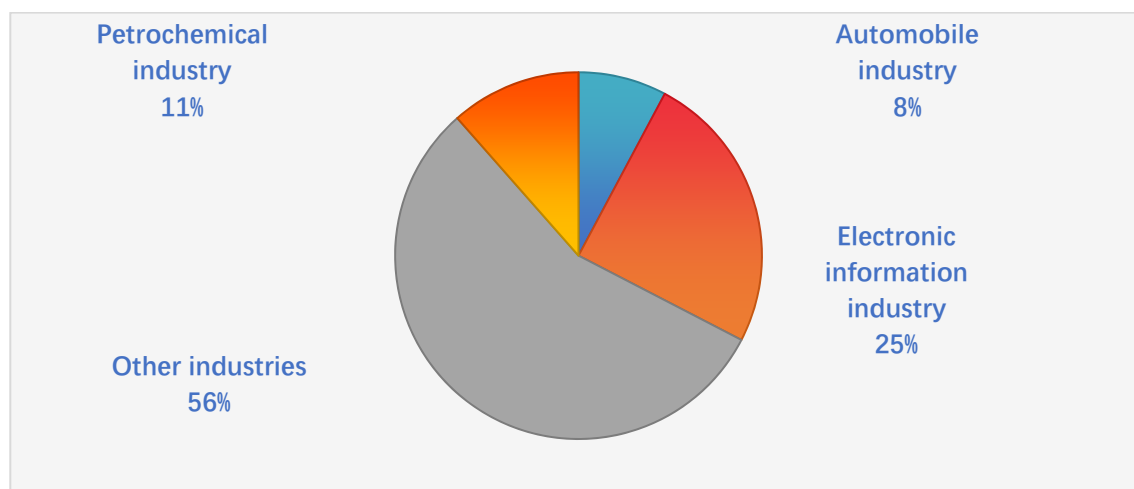


Figure 1. The following chart shows the proportion of social industries in the total manufacturing industry in 2019

In recent years, due to the impact of many factors, China's chemical enterprises are facing a more severe development situation. First of all, it is the low price of various chemical resources. Among these resources, the most representative is

crude oil [2]. From 2009 to 2024, China's crude oil market experienced significant complications, and oil prices continued to fluctuate. This volatility is partly due to the sharp reduction in social demand for crude oil brought about by

international factors and the epidemic, resulting in a serious imbalance between supply and demand, which in turn has had an impact on the chemical industry. At the same time, the rapid development of the new energy sector has put pressure on the chemical industry. At present, one of the main trends of social development is the pursuit of green and environmental protection, new energy technology has been widely used, and has obtained a positive market response, which has occupied the market share of the chemical industry to a certain extent, limiting its development space. Under the combined effect of these factors, China's chemical industry is currently experiencing a downturn and facing severe development challenges. The following chart shows the proportion of social industries in the total manufacturing industry in 2019.

As can be seen from the chart above: in 2019, the chemical manufacturing industry accounted for 11.5% of the total manufacturing industry, which is less than half of the electronic information manufacturing industry. It can be seen that the current development of chemical manufacturing industry is more severe.

At present, the global petrochemical industry is undergoing significant changes. The structure of the petrochemical industry is rapidly adjusting, and the development of the industry in the eastern and western hemispheres presents different trends; Driven by the acceleration of petrochemical construction in emerging economies, the scale of global refining capacity continues to expand, and the power competition between the global petrochemical industry is more intense. With the implementation of carbon peak and carbon neutrality, the low-carbon transformation of the global petrochemical industry is taking great strides. At the same time, affected by the global political and economic situation and emergencies, the petrochemical industry cycle under the original balance may not be sustainable, and the starting point of a new round of balance cycle may be at present. China's petrochemical industry has prominent problems, although China's petrochemical production capacity has been in the world's leading level, but the overall competitiveness is insufficient, the plant operating rate is low, the income level is poor; The domestic supply of some high-end products is seriously insufficient, mainly relying on imports, and there is a phenomenon of product and technology "jam"[3].

3. The Problems Existing in The Development of China's Chemical Industry

As an important support of the national economy, the chemical industry is regarded as a strategic focus by many countries because of its large scale, long industrial chain, intensive capital and technology, extensive driving effect and close correlation with daily life. Chinese chemical enterprises encounter many challenges on the road of innovation and development, such as high dependence on foreign technology, insufficient investment in innovation funds, imperfect innovation system, and shortage of innovative talents. In recent years, with the rapid development of chemical related industries, the market demand for fine chemical products has been improved in quantity, type and quality, which provides a broad market space for the development of China's chemical industry.

At present, the production equipment in service of China's chemical industry almost all adopt foreign technology (or

optimize and upgrade on the basis of foreign technology), especially in the field of fine chemical industry, domestic independent research and development of production process is almost a blank. China is limited in the research and development of high-end chemical products by technical capabilities, coupled with the strict control of international technology owners on technology transfer, which makes us in the independent supply of important materials such as high-performance rubber, specialty chemical plastics and engineering grade polyolefin, there are shortcomings, and we have to rely heavily on imports. In 2019, the self-production of chemical rubber in China is only 29%, the self-production of engineering polyolefin in China is 18%, and the self-production of high-performance rubber in China is only 34%, which makes the production of chemical products in China difficult, affects the structural properties of products, and leads to the development of China's chemical industry has been greatly hindered [1]. In the pursuit of green, environmental protection and low-carbon development today, technological innovation has become the key to solving industry problems. How chemical enterprises actively adapt to the new environmental requirements, integrate new elements into the enterprise innovation system, so as to give enterprises new functions and creativity, and achieve sustainable development through technological innovation, has become a practical problem that the majority of chemical enterprises need to solve urgently. Secondly, the unreasonable chemical product system is also the problem faced by the domestic chemical industry. The continuous addition of new production capacity has made the domestic chemical market a trend of product homogeneity, and the competition has become more intense. In addition, the huge potential of the Chinese market has also attracted international attention, which has also led to a decline in the market share of China's chemical enterprises to some extent.

Therefore, these problems have led to the development of China's chemical industry has been greatly hindered, but also makes the chemical market show more participants, more fierce competition situation.

4. Artificial Intelligence Technology Promotes the Promotion of Chemical Enterprises

4.1. Artificial intelligence technology promotes the improvement of enterprise production efficiency

With the acceleration of the global industrialization process, the chemical industry is an important part of the modern industrial system, and the improvement of its production efficiency and productivity is of great significance to promote economic development, meet social needs and protect environmental resources [5]. However, the problems of high energy consumption, low utilization rate of raw materials, production cost and environmental impact in the process of chemical production have become increasingly prominent, and it is urgent to solve them through technological innovation. Many research teams and enterprises at home and abroad have begun to explore the application of new technologies and new methods to optimize chemical processes, including process strengthening, energy recycling, intelligent chemical production and digital transformation, aiming to improve the efficiency and sustainability of

chemical production [6].

In recent years, with the rapid development and application of intelligent technology, new chemical instrument technology has emerged at the historic moment, providing innovative solutions for chemical production. Through the precise control and real-time monitoring of the production process, these technologies can not only greatly improve the production efficiency and product quality, but also significantly reduce the production energy consumption and the safety hazards of the production process [7].

The chemical industry's production process is complex and the data exchange is frequent, if it completely relies on manual operation, not only labor intensity, but also prone to errors. In this context, the introduction of artificial intelligence technology into the production process can significantly improve efficiency. By integrating artificial intelligence into production systems and building intelligent production databases, production management can be optimized. As shown in the example, the database can integrate customer information and order time for systematic classification and storage. Based on this data, the production process is accurately optimized and adjusted. The production process using artificial intelligence can significantly reduce the operating costs of chemical enterprises, reduce the consumption of human and material resources, while maintaining or even improving productivity and increasing corporate profits. Such intelligent transformation helps to improve production efficiency and speed, and helps chemical enterprises to efficiently complete production targets.

At present, the latest operation and maintenance concept adopted by domestic chemical enterprises advocates to give priority to prevention, from regular maintenance to preventive maintenance, using advanced scientific means to prevent problems before they happen and improve the reliability of equipment [4]. Large and medium-sized chemical enterprises, the production process is toxic, harmful, flammable, explosive, high temperature, high pressure, and chemical enterprises are generally used to "chemical equipment maintenance procedures" as the basis for equipment maintenance decisions, without taking into account the quality of the equipment itself, equipment operating conditions and differences in the level of operation and maintenance. The biggest feature of state maintenance is that the maintenance cycle and maintenance content of the equipment are determined by the operating efficiency and state of the equipment, and the targeted maintenance of the equipment is selected at the right time, which is a scientific and economic repair mode. This requires a lot of capital and talent investment to do basic accumulation and research before it can be implemented. Therefore, there is a very urgent need for online monitoring, intelligent state judgment and operation trend management of key units.

4.2. Artificial intelligence technology improves enterprise security

The control link of chemical enterprise production is the guarantee of product quality. Barrier. In fact, most chemical companies have numerous types of products. Many, but all have a certain degree of danger, it is easy to explode, If the internal control of the enterprise is not strong, the control system is relative. Loose, once there is a problem, not only will cause losses, but also on. Serious harm to the environment, workers and businesses. So, a section. Rigorous management and control system is undoubtedly the guarantee

of enterprise security. Will. The combination of artificial intelligence platform and chemical enterprise management and control system can. In order to greatly reduce the incidence of accidents. Corporate governance processes, developed and controlled by an AI platform, usually do not require work. Personnel are involved and the entire process is flat through computer data. Station to carry out the control. Through the collection and classification of production data. Analysis, to supervise and control the corresponding production process. Not only as This AI platform can also be used on enterprise production environments. Monitor, predict the occurrence of problems, and formulate solutions in time. Case, to deal with the problem safely. Compared to this kind of control. Stronger accuracy in manual supervision. To a certain extent, To ensure the stable operation of chemical production.

5. Conclusion

In recent years, chemical enterprises have been affected by external factors. Large, so that its operating environment to a certain extent by direct or. The indirect effect. For example, when chemical products are made of raw materials. Or if the price of auxiliary materials goes up, it will make the business work. Changes in relevant processes affect the quality of chemical products. However, due to the influence of external factors, the operation of traditional chemical enterprises. The model has been difficult to adapt to the needs of the new situation. Use artificial intelligence. The development of the enterprise operation process by the platform will not only make the process. The expansion of the scope will also make the functional content more comprehensive and even cover. The whole enterprise produces daily. Artificial intelligence enterprise operating environment. It will also make use of intelligent data systems when the market changes. The optimization and adjustment of the line operation plan help chemical enterprises to survive the market. During the turbulent period, the transformation was successfully completed [8]. Artificial intelligence operation process. It can not only ensure the stable progress of enterprise production, but also promote. Enterprises to create greater profit margins, enhance profitability, promote. Chemical enterprises have developed steadily. For chemical enterprises, with artificial intelligence data platform. The integration can be more efficient and stable to complete production, but also to ensure the safety of the enterprise to the greatest extent. Make chemical enterprises pendulum. Get rid of the shackles of traditional fixed models and realize real intelligent production. And intelligent operation, but also for the future development of chemical enterprises a clear direction was given.

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