Research on the Optimization Design of Supply Chain System of Jilin Chemical Industry

Li-Xia WANG* and Xin SU

School of Economics and Management, Jilin Institute of Chemical Technology, Jilin, China

*45448105@qq.com

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Abstract. The chemical industry plays an important role in the national economy and social development of Jilin Province, especially the competition among enterprises turns to the competition among the supply chains of enterprises at this stage. The optimization of the supply chain system plays an important role in accelerating the development of enterprises and improving the economic benefits of enterprises. Therefore, based on the characteristics of chemical enterprises, this paper discusses the supply chain optimization path from six aspects: technical resources, procurement resources, marketing resources, logistics services, production resources, and information resources. Enhance the overall competitive advantage of Jilin province's chemical industry, so that it can play a better role in the social and economic development.

Introduction

Chemical industry is the basic industry of a country. The development and competitiveness of chemical enterprises directly affect the comprehensive national strength of a country. Chemical enterprises are characterized by a high degree of globalization, a large number of suppliers and consumers, and chemical production enterprises play a dual role—suppliers and users; enterprises have a wide range of products, long and complex production processes, and long sales and procurement links, which are directly related to the international competitiveness of chemical enterprises. In the fierce competition environment of the chemical industry, all of these links are comprehensive. It is very important for the survival and development of chemical enterprises to master the information from all aspects of the world in time, deal with the supply and demand relationship in the global market, and adjust all links of the supply chain flexibly.

The Theory of Supply Chain Optimization

The problem of supply chain optimization consists of decision variables, objective functions and constraints. Decision variables are decisions to be made. In logistics, there are the following decision variables: when and where to order raw materials from suppliers; when to produce, when to deliver products to customers, and how much. The objective function is the goal to be achieved economically or in other aspects. In logistics, there are the following objective functions: the maximum profit, the lowest supply chain cost, the shortest life cycle; the highest customer service quality, the shortest delay, the largest output; to meet all customer needs, etc.

The research on supply chain management has always been a hot topic of academic research at home and abroad. In recent years, typical representatives of the research on the supply chain network of the chemical industry, such as Dong Yonghong and Wang Yejun (2013), have analyzed the problems existing in the green supply chain management of coal chemical enterprises in Hebei Province from the aspects of procurement mode, production process and sales links, and analyzed the internal and external drive of the implementation of green supply chain management in coal chemical enterprises Power and optimization strategy. According to the characteristics of chemical enterprises, Tian Dejin, Wei Kecheng, et al. (2016) established a collaborative evaluation model system applicable to the supply chain network of chemical enterprises in terms of industrial metabolism balance, enterprise competitiveness, contract execution ability and information
interaction ability. Lu Shichang and Cui Zhanhong (2017) analyzed the problems and deficiencies in the current green supply chain management of China's chemical industry, and proposed a green supply chain management model based on industrial agglomeration.

In summary, it is not hard to see that as an integral part of an enterprise, supply chain is an essential key link to reduce operating costs and improve customer satisfaction. It has become a hot issue in the academic circles at home and abroad. But on the whole, there are still some deficiencies in these research results, mainly reflected in: first, the research scope rarely reflects the nature of the industry. It focuses on the inventory management, cost control, risk management and model building of supply chain. The chemical industry plays an important role in the national economy and social development of Jilin Province, so it is of great significance for the development of enterprises to carry out supply chain research. Secondly, the regional characteristics of the research samples are not obvious, not to mention the research results for Jilin Province. Because supply chain integration is greatly influenced by regional policies, social culture and people's value orientation, the dimensions of supply chain in different regions should be different. Therefore, it is of great significance to study the integration path and Countermeasures of supply chain in Jilin province's chemical industry.

**Significance of Supply Chain Optimization in Jilin Chemical Industry**

The chemical industry of Jilin Province is rich in development and has certain regional characteristics. For example, the biochemical industry in Songyuan City, the automotive industry in Changchun City, the petrochemical industry in Jilin City, the fine chemical industry in Siping City, and the organic chemical industry in Baicheng City. In the face of the decentralized characteristics of chemical enterprises, it is necessary to organize them together for unified management, integration of industry resources and improvement of resource utilization.

In recent years, more and more attention has been paid to the chemical industry, and the operation mechanism of its supply chain has been gradually concerned by people. For the chemical industry, the design, operation and management of the supply chain can have a huge impact on the economic benefits of the whole industry, and also directly determine the development height and direction of the enterprise. Now, some enterprises have begun to choose to establish strategic cooperation relationship with other enterprises, carry out strategic cooperation among enterprises, and integrate resources, so as to achieve the excellence of the supply chain Change. This shows that enterprise managers have realized the importance of resource integration in supply chain collaborative management. Strategic cooperation with other enterprises is an effective means of supply chain management, and also an important content in the process of supply chain optimization. The stable coordination of cooperation among chemical enterprises can better realize resource sharing, supply chain sharing and benefit sharing among chemical industries.

**Optimization Path of Internal Supply Chain of Chemical Enterprises**

**Optimization of Supply Chain in Petrochemical Enterprises**

Taking Jilin Songyuan Petrochemical Co., Ltd. as an example, petrochemical enterprises have long production chain, wide business, diverse products, many types of crude oil, complex processing routes, close relationship between the top and the bottom, and are facing the ever-changing market. Only by strengthening innovation and structural upgrading, and doing a good job in supply chain optimization, can they pursue more quality development, improve comprehensive competitive advantage. It is helpful for enterprises to utilize limited resources and obtain greater economic benefits.

The optimization solution of the supply chain of petrochemical enterprises is oriented to the business links of raw material purchase, production and processing, product sales, etc. with resource optimization as the core, it optimizes resource allocation and arranges the production of enterprises. Through the application of this solution, we can optimize the structure of raw materials and
products, maintain stable and long-term production, improve the technical and economic indicators of enterprises, support cost reduction and efficiency increase, and maximize economic benefits.

**Optimization of Supply Chain in Oil Refining Enterprises**

Taking Jilin Jihua oil refinery as an example, the optimization plan focuses on the optimal allocation of production resources, and provides the optimization of crude oil procurement, processing plan, product structure, etc. Based on crude oil evaluation, blending component properties, sulfur distribution and DB data of secondary unit, the sub models of purchase and sales, production unit and oil blending are constructed, and the purpose of optimization calculation is achieved through model application.

**Optimization of Supply Chain in Chemical Enterprises**

This scheme takes the optimized configuration of ethylene raw materials as the core, and provides the functions of ethylene raw material procurement, device processing scheme, product structure optimization, etc. Supported by ethylene raw materials, polymer grades and plant material consumption data, the sub models of purchase and sales, production equipment, inventory and so on are constructed, and the purpose of optimization calculation is achieved through the application of the models.

**Optimization of Supply Chain of Refining and Chemical Integrated Enterprise**

Realize the overall optimization of refining and chemical production plan, comprehensively consider the requirements of refining and chemical production, optimize the purchase of crude oil, production and processing, and maximize the overall benefits of refining and chemical integration. Based on the optimization model of oil refining and chemical industry plan, an integrated model is built. The calculation results include the production arrangement of oil refining and chemical industry in the whole enterprise, which improves the integrity of enterprise plan. According to customer requirements, automatically generate business reports that meet the habit of business personnel, so that the enterprise personnel can analyze the results.

**Integration and Optimization of Supply Chain in Jilin Chemical Industry**

The integration of supply chain in Jilin chemical industry should be led by the provincial government, with the full cooperation of local government. The departments of demand management, customer relationship management, order execution, customer service, production process management, procurement management, return management and supply chain planning should be set up, and the supply chain planning and performance evaluation team should be set up. To build a supply chain optimization solution for chemical enterprises, it is oriented to business links such as raw material procurement, production and processing, product sales, etc., with resource optimization as the core, to optimize resource allocation, arrange enterprise production, and obtain greater economic benefits. It is proposed to optimize the supply chain system from the following paragraphs.

**Optimization of Technical Resources**

From the global level, we should break through the bottleneck of external product resources and technical resources, strengthen strategic cooperation with scientific research institutions, downstream and end customers, build a comprehensive and three-dimensional technological innovation platform, improve the technological innovation system and operation mechanism, introduce and cultivate large product categories or core technologies, and achieve new breakthroughs that are hard to be imitated by competitors. Taking the construction of seven mechanisms as the core content, we will continue to deepen the construction of technological innovation mechanism, namely: resource allocation mechanism, talent incentive mechanism, organization guarantee mechanism, industrial incubation mechanism, knowledge management
mechanism, cultural activation mechanism, production, teaching and research cooperation mechanism.

**Optimization of Purchasing Resources**

Establish chemical industry procurement center to realize centralized procurement of raw materials. Give full play to the leading role of Jilin Jihua company, summarize the procurement needs of all subordinate companies to the chemical industry procurement center, and the procurement center will make a unified ordering plan. For the bulk raw material purchasing center, through strengthening the research and analysis of raw material market information, improving the ability to judge and grasp the trend of raw material market, adopting the operation modes such as lock up and stock up, to achieve cost reduction in purchasing. In addition, through the integration of demand, give full play to the advantages of brand, capital and scale, strengthen the ability of business negotiation, and obtain batch advantages.

**Optimization of Marketing Resources**

Establish the marketing center of chemical industry to realize the concentration of product marketing. In the marketing center, we will promote refined marketing management, strengthen the process management of salesmen, subdivide and concentrate on the domestic regional markets, subdivide the customer base according to the value contribution, improve the stickiness of high-quality customers, strengthen the optimal allocation of customer resources, and improve the utilization rate of customer resources; promote the rapid growth of the number of large and strategic customers above the norm, optimize the customer structure, and lock in the major large customers, focus on the company's resources to break through.

**Optimization of Logistics Service**

Establish the distribution center of chemical industry to realize centralized storage management and unified outsourcing of distribution logistics. The warehouse is divided into raw material warehouse and finished product warehouse. The products produced by each company are stored in a comprehensive finished product warehouse after inspection. This can reduce the impact of multi-point pick-up on the efficiency of sales order execution. The original distribution time increases with the increase of pick-up points. On average, each additional pick-up point will increase the time by half an hour. Now, the products that need to be distributed can be loaded only once.

**Optimization of Production Resources**

Establish the production management center of the chemical industry, realize the unified scheduling for the production of subordinate production plants, make full use of the production resources of each chemical enterprise, realize the collaborative production of the whole chemical industry, and effectively support the unified purchase and sales. Using ERP's powerful production planning and scheduling ability, we can deal with various complex factors, automatically generate the main production plan and production operation plan, and ensure the orderly production.

**Optimization of Information Resources**

Establish chemical industry information center to realize unified planning and management of information. Jilin chemical industry has more than ten subsidiaries. Each subsidiary's IT planning, construction and management is under the unified responsibility of the chemical industry information center, which ensures the unity of the IT infrastructure, information architecture, application architecture and technical architecture of each company, the sharing of IT resources, the integration of information and business processes. It simplifies the organizational structure, saves the operation management cost and improves the management efficiency.
Conclusion

In order to play the scale effect of resource utilization and sharing of upstream and downstream enterprises in the cluster, the chemical industry should closely contact with upstream and downstream enterprises for resource technology sharing and form chemical industry alliance. Through the reasonable connection of raw materials and finished products, the chemical industry can reasonably use the resources of each enterprise, so as to reduce the production cost and the cost of waste treatment, and improve the economic and environmental benefits. It is helpful for Jilin chemical industry to establish a good brand image, attract more excellent talents, retain core employees, improve the financial returns of enterprises and reduce risks. In short, through the supply chain optimization path design and countermeasure research of Jilin chemical industry, on the one hand, it can improve the level of supply chain management, on the other hand, it can improve the intangible assets reserve and financial return, finally, it can enhance the overall competitive advantage of Jilin chemical industry, so that it can better play its middle class in the social and economic development The role of mainstay.

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