



Research on Collaborative Response Mechanism of Supply Chain and Power Grid Project Construction

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Abstract. This study focuses on how to make a rapid collaborative response between demand and supply of power grid project construction material considering its prominent contradictions and great uncertainty. The differentiated design of the rapid response mechanism of power grid material supply could provide a solid guarantee for the comprehensive improvement of the power engineering material service and supply chain operational performance. This research analyzes the definition of supply chain collaborative management theory and the definition of collaborative response mechanism. Moreover, it investigates multiple strategies to improve the response speed of material demand of power grid engineering construction projects.

Keywords: Supply Chain Management · Collaborative Response

1 Introduction

1.1 What is Supply Chain Collaborative Management Theory

Supply Chain Collaborative Management Theory is based on Synergetic and Supply Chain Management Theory and was proposed by the supply chain management expert David Anderson in the mid-1990s. Supply chain collaboration combines scattered independent enterprises or departments in the supply chain with specific advantages and are in different value-added fields (such as resource provision, research and development, production and processing, logistics services, and marketing, etc.) [1, 2].

Supply chain collaboration embodies three aspects [3]: firstly, supply chain collaboration is to make the node members of supply chain better connected, emphasizing and focusing on the relationship and interaction of them; secondly, supply chain collaboration addresses the market changes by customer needs, and is designed to make the flow of the logistics, information and capital among node members unhindered in the entire supply chain system network; thirdly, supply chain collaboration aligns all the node member goals, the many independent members would act like one, maximizing the overall benefits will always be the starting point of their interaction.



Fig. 1. The Collaborative Response Mechanism [self-painted]

Supply chain collaboration aims to build one highly integrated supply chain, which could benefit the strategic partnership among chain node member enterprises, the reduction of cost and inventory level, the shortening of lead time, the improvement of services, and make the increasement in market share possible. In the market competition, through supply chain collaborative management, two or more enterprises or internal departments can achieve complementary advantages, realizing goals or accomplishing tasks that cannot be achieved by individuals alone.

1.2 What is Collaborative Response Mechanism

The rapid response mechanism is the establishment and optimization of various mechanisms based on time. It is to obtain the competitive advantage of material supply service in terms of time by improving the response speed and flexibility of the system. The efficient coordination of multiple departments is the basis for the rapid response of the material supply chain to engineering construction projects [4]. By implementing the following strategies, the relationship between material supply and demand can be optimized, and the response speed of material demand of power grid engineering construction projects can be improved. The specific strategies are material standardization, information flow optimization, demand forecasting and management optimization, supply and demand time matching optimization, and advance reserve optimization (Fig. 1).

2 Material Standardization Strategy

Promoting material standardization, setting clear procurement standards, optimizing and clearing procurement strategies are the basis for implementing rapid response.

The first is to expand the scope of the material procurement standard system, deepen the application of material procurement standards in bidding procurement, contract signing and other procedures, improving the accuracy of grasping material procurement needs and the efficiency of procurement standards application.

The second is to strengthen the application of material procurement standards, improve the material master data publication mode, strengthen the publicity of procurement standards, implement the system identification of technical specifications, establish the review mechanism, and improve the accuracy and efficiency of front-end material demand confirmation.

The third is to strengthen the collaboration of various standards such as operation and maintenance, infrastructure construction, design and materials, and by adoption of the typical design drawings, promoting the time compression of the drawing confirmation, and to a certain extent, striving time for the implementation of material procurement and supply.

3 Information Flow Optimization

Information flow optimization is the premise of implementing rapid collaborative response [5].

The first is to improve the collection, arrangement and maintenance of basic data on material supply. Complete basic data set is an important cornerstone to realize the material supply informatization. Based on the formulation of key data and lists, the automatic real-time collection of key information would be realized by supplementing technical methods.

The second is to strengthen information sharing. The information flow should be transmitted quickly, accurately and in real time. It is necessary to strengthen the information coordination within the organization, promote the information sharing and seamless connection between suppliers, and realize the rapid transmission, efficient coordination and continuous supply of the entire supply chain information flow.

The third is to promote the upgrading of information systems. The company-level material information system is needed to integrate supply chain information and strengthen comprehensive utilization of supply chain information. Along the entire supply chain, it is necessary to develop special system modules, strengthen emergency plan management, reduce manual intervention in emergencies, and improve the timeliness of rapid collaborative response mechanisms.

4 Demand Forecasting and Management Optimization

The first is to improve demand forecasting ability. Through the establishment of material demand forecasting methods and collaborative operation mechanisms, effective collection of information from all parties involved in forecasting and planning, comprehensive coordination and communication, and improvement of forecast accuracy, the accuracy of material demand planning and the efficiency of procurement management will be improved.

The second is to simplify the entire management chain through the optimization of the internal management of materials. According to different requirements for rapid response, production characteristics and supply methods, through material management optimization, the whole-link management chain compression and lead-time optimization are carried out to achieve rapid response to demand.

5 Supply and Demand Time Matching Optimization

Time matching optimization of supply and demand is the most direct strategy to solve the contradiction between supply and demand. It mainly includes measures in three aspects.

The first is the optimization of demand lead time. The specific measures are: increase the lead time for demand submit by strengthening the effective management of the demand side, clarifying the requirements for demand submit and lead time standards; through standardization and business process optimization to increase the lead time for material demand.

The second is the compression of supply time. The specific measures are: the compression of supply time depends on the material standardization level, the optimization and management of the contract reserve strategy. The higher of the material standardization level and the more reasonable contract reserve strategy are, the fewer material supply nodes (order processing - order allocation - material distribution) and the faster response speed will be; for the contract reserve strategy that are sold on consignment, the supply response time will be shorter, since the supply response is arranged by supply - materials delivery components. For materials with certain customization requirements, the response speed will decrease due to the time increment of customized production cycle. Therefore, for the materials purchased within the framework, the compression of the supply time is mainly aimed at the reduction of the supply nodes and the compression of the processing time of the specific nodes under this framework procurement method.

The third is the simultaneous optimization of supply and demand time. It is a comprehensive method of the above the two time compression methods.

6 Reserve Strategy Optimization

According to the demand characteristics of power materials and the production and supply situation, reasonable reserve strategies, scientific reserve quotas, and effective reserve methods are necessary ways to improve the rapid response capability and efficiency of material supply. If the reserve structure is unreasonable, it will cause the materials with prominent contradiction between supply and demand or the urgently needed materials to be unable to respond in time, and the turnover efficiency of the stored materials will be low. If the reserve quota is not set scientifically, it will result in demand unresponsive due to insufficient stock. If the reserve method is unreasonable, it will cause the company's capital occupation and storage costs to rise while the response efficiency declines. From the perspective of goals and requirements of rapid response, according to the characteristics of supply and demand of power engineering materials, by determining the reserve strategy, reserve quota, and reserve method rationally, improving them as well as management model especially for materials with prominent contradiction between

supply and demand, utilizing the buffering effect of its advance reserve, promoting the optimization of its supply and demand relationship, will all improve the rapid response capability and efficiency of such materials.

7 Conclusions

In order to respond to customer needs, procurement and supply must meet the material requirements of project construction, and the collaborative ability of enterprises in material management is crucial. This paper proposed and established a collaborative rapid response mechanism for material procurement and supply and engineering construction projects, in order to adapt to the development trend of share increment, such as facility supporting projects for business expansion and etc., in electricity market, meet the rapid electricity demand of users from entering the park to putting into production, and promote the coordinate combination of the standardization and flexibility of the company's material management.

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