Research on Supply Chain Collaborative Manufacturing Mode

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Abstract. In this paper, through the study of supply chain collaborative manufacturing business process and resource interaction mode, from collaborative planning, collaborative procurement, collaborative production, collaborative logistics and collaborative service five supply chain business links. With the support of supply chain collaborative manufacturing platform, the overall competitiveness of supply chain collaborative manufacturing is improved, and the real-time interaction and information sharing of material flow, information flow and capital flow among suppliers, manufacturers and customers are realized.

1. Introduction
With the rise of new technological revolution and industrial changes, the global industrial technology and competitive landscape are undergoing significant changes. The developed countries have introduced a national strategy of "re-industrialization" centered on advanced manufacturing. In the context of global integration, the form of enterprise market competition has evolved from competition between enterprises to competition between supply chains and supply chains. The domestic supply chain itself has developed relatively late, and many manufacturing companies have developed slowly in supply chain coordination. In terms of informatization, they are still stuck in internal management systems such as ERP and manufacturing, and have not formed a mature coordination mechanism.
As China launches a high-quality development strategy, the manufacturing industry needs to integrate the entire value chain into the product cycle for organization and management, forming a business model, upstream and downstream services, and organizational work to reconnect to form an organic synergy. In order to achieve real-time interaction between suppliers, manufacturers and customers, and to solve the problem of information interconnection between various business links, it is necessary to study the collaborative manufacturing model of the supply chain.
Based on the research of supply chain collaborative manufacturing business process and resource interaction mode, this paper focuses on the core production enterprises, from the five major supply chain business links of collaborative planning, collaborative procurement, collaborative production, collaborative logistics and collaborative service, relying on the support of the supply chain collaborative manufacturing platform to improve supply. The overall competitiveness of chain collaborative manufacturing realizes the real-time interaction and information sharing of material flow, information flow and capital flow among suppliers, manufacturers and customers.

2. Core Business Process of Supply Chain Collaborative Manufacturing
The core process of supply chain collaborative manufacturing includes five core links: collaborative planning, collaborative purchasing, collaborative production, collaborative logistics and collaborative service. The platform supports the whole business process of collaborative manufacturing in the whole supply chain. Collaborative planning mainly refers to planned supply chain, including planned
procurement, planned production, planned logistics and planned return; Collaborative Procurement includes procurement of inventory products, order production products and engineering customized products; collaborative manufacturing includes inventory production, order production and engineering customization; collaborative logistics includes inventory products, order production products, engineering customized products and retail products Distribution; collaborative service includes material return and product return.

![Figure 1. The core business process of SC collaborative manufacturing.](image)

3. Analysis of Sub-processes of Supply Chain Collaborative Manufacturing

3.1. Collaborative Planning

Planning collaboration is mainly to evaluate the overall production capacity and overall demand planning of the enterprise, as well as to plan and arrange the inventory, distribution, production and materials of products. Through the establishment of relevant analysis model for historical customer data, sales data, purchasing data, etc., enterprises can predict the next step of planned supply chain, so as to shorten the response time of the whole supply chain, improve enterprise profits, and achieve the purpose of reducing costs and increasing efficiency.

3.2. Collaborative Procurement

It includes the business process of receiving materials and products, formulating the receiving of suppliers and raw materials, supplier evaluation, procurement and transportation management, procurement quality management, procurement contract management, purchase freight condition management, specification management of purchased parts, etc.

3.3. Collaborative Production

Collaborative production includes three modes: Production by inventory, production by order and engineering customization. In the collaborative production process of supply chain, according to the arrangement of production activities, distribution of raw materials, production and testing, packaging, product inventory, logistics and other links, real-time data of products are obtained through sensors and radio frequency identification devices on the production line, so as to realize the visualization of the whole business process of the supply chain.
3.4. Collaborative Logistics

Supply chain collaborative logistics is to meet the needs of customers, through transportation, storage, packaging, handling, circulation and processing, distribution and other links to achieve raw materials and products from suppliers, manufacturers and customers.

4. Resource Classification of Supply Chain Collaborative Manufacturing

After reasonably classifying the resources of supply chain collaborative manufacturing, the resources are described by a certain resource data representation method. According to certain resource allocation rules and configuration processes, the optimal allocation scheme of resources is recommended to suppliers, manufacturers and customers.

The classification of supply chain collaborative manufacturing resources can be classified from materials, level and association according to their attributes. Materials include equipment, manpower, materials, software, information and services; levels can be divided into equipment level, unit level, workshop level and enterprise level; association can be divided into time, space, sequence and control. The classification of supply chain collaborative manufacturing resources is shown in Table 1.

| Attribute     | Classification                                                                 |
|---------------|--------------------------------------------------------------------------------|
| material      | Equipment, manpower, materials, software, information and service              |
| arrangement   | Equipment layer, unit layer, workshop layer and enterprise layer               |
| relation      | Time, space, sequence, control                                                |

5. Resource Interaction Process of Supply Chain Collaborative Manufacturing

The interaction flow of material flow, information flow and capital flow among suppliers, manufacturers and customers in supply chain collaborative manufacturing is shown in Figure 2.

5.1. Business Interaction between SUPPLIERS and Manufacturers

The business interaction between suppliers and manufacturers mainly takes place in four scenarios: collaborative planning, collaborative purchasing, collaborative production and collaborative service.
Collaborative planning includes raw materials, parts and equipment procurement demand data, inventory data, distribution data, production capacity data, delivery time, budget and other data;
Collaborative Procurement includes supplier evaluation, order data, distribution data, transportation route, transportation tools, procurement quality management data, procurement contract, delivery time, raw material conversion, etc;
Collaborative production includes information exchange such as raw material distribution, manufacturing and testing, including, product inventory, product mating and delivery;
Collaborative services include settlement and payment, schedule, pre-sale consultation and return and exchange services.

5.2. Business Interaction between Manufacturer and Customer

The business interaction between manufacturers and customers mainly occurs in two scenarios: collaborative logistics and collaborative service.

- Collaborative logistics scenario mainly interacts with order data, inventory data, packaging data, transportation mode and tool arrangement, installation and trial operation;
- Collaborative service scenario mainly interacts information such as pre-sale consultation, return and exchange data, delivery data and payment data.

6. Conclusion

In this paper, based on the demand of supply chain network collaborative manufacturing business, in view of the problems faced by supply chain network collaborative manufacturing, through the analysis of supply chain network collaborative manufacturing business process, resource classification, resource interaction process and other aspects of research, to help enterprises eliminate the manufacturing information island, make the whole supply chain with faster response speed and more forward predictability To better resist all kinds of risks and provide the best products and services for customers at the lowest cost.

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