Constructing the Collaborative Supply Logistics Operation Mode in Assembly System under JIT Environment

Guo Li, Beijing Institute of Technology, China
Tao Gao, Hebei Electronic Information Products Supervision and Inspection Institute and Industry, China
Lun Ran, Beijing Institute of Technology, China

ABSTRACT

In the JIT assembly system, if any supplier does not deliver the raw materials or components on time, or in the right quantity, the core manufacturers will not assemble on the schedule, which will bring great loss to the whole supply chain and greatly reduce the competitiveness and collaboration of the entire supply chain. Based on a survey on supply chain collaboration and operation model, supply logistics in JIT environment are analyzed from both the inside and outside system with the research goal of coordinating the upstream supply logistics. In order to help manufacturers implement the JIT production, the VMI-Hub operation mode is proposed from the aspect of inside system, and from outside system, cross-docking dispatch operation mode is considered to coordinate the supply logistics in assembly system.

Keywords: Assembly System, Collaborative Supply Logistics, JIT Environment, Supply Logistics, VMI-Hub

1. INTRODUCTION

Generally speaking, enterprise logistics can be divided into in-bound logistics, in-plant logistics, out-bound logistics, returned logistics and waste material logistics. For an assembly enterprise, in-bound logistics is the most complicate and important part. Especially when enterprises emphasize core-competitiveness and outsource the most non-core business, supply logistics cost accounts for more and more of the sales. In order to reduce the storage and relevant cost, assembly enterprises require their suppliers to deliver raw materials or components in small amount, high frequency and right time to support the their JIT production. Many component suppliers have to invest building factories or warehouse around the assembly plants, or rent warehouses to store the components, so that they can become partners of big assembly
enterprises, but the above policies are not beneficial for economy of scale and increase the cost of inventory and transportation. Apparently, assembly enterprises will benefit, but the substantial reduction of the inventory cost is always counteracted by shifting component price raised by suppliers, which is harmful to the whole supply chain.

In order to solve these problems caused by JIT production, some new management ideas and operating models have been proposed and practiced. Some assembly enterprises start to fetch raw materials or components from suppliers in the “Milk run” to reduce the over-high transportation cost caused by suppliers who provide raw materials or components in high frequency and small amount, rather than require suppliers to deliver raw materials or components to the door. Some assembly enterprises start to use the “Supply-hub” operation mode between assembly factories and suppliers, which means that the cooperated 3PL (the third-party provider of logistics service) or assembly enterprises rent unified warehouses, then the suppliers deliver raw materials or components to the warehouses according to orders placed by assembly enterprises, and finally the 3PL deliver raw materials or components to the work station of assembly enterprises according to the production schedule, just so as to reduce excess components inventory and over-high management cost in traditional decentralized VMI model.

These new operating models are based on the collaboration of assembly enterprises with the supply logistics (in-bound logistics). Although they have been used in the management practice and achieved some good results, there are still many problems needed to be solved in both theory and strategy, such as how to control and manage the storage rate of “Supply-hub”, how to balance the order quantities of different components and choose the right transport way, and how to deal with orders during the operation process and share information among partners who consider the matching attribute among components and the difference in loading capacities of single batch of components. Based on some research results the above problems, the authors try to conduct deep study and discussion on collaborative supply logistics operation mode in assembly system under the JIT environment, try to explore the reasons of the problem, and finally propose new ideas and new ways of coordinating supply logistics in assembly system.

2. LITERATURE REVIEW

Generally speaking, collaboration between enterprises or partners in the supply chain can be divided into strategy level collaboration, tactics level collaboration and technical level collaboration. However, the strategy level collaboration is the highest level, but the technical collaboration can realize the synchronous operation between partners in the supply chain and the information sharing supported by collaboration technology. The collaboration can also be divided into demand forecasting collaboration, product design collaboration, plan collaboration, purchase collaboration and inventory collaboration from the aspect of collaboration content.

Strategy level collaboration is based on conceptual model and collaborative management idea, which is mainly focused on in-depth discussion and analysis of key elements of supply chain collaboration management, expected value gains of collaboration, collaboration mechanism and collaboration nature. Xu and Beamon (2006) proposed the four-step strategy for enterprises about how to choose the right collaboration mechanism based on the four aspects, such as resource structure, decision type, control level and risk / revenue sharing between enterprises and their partners in the supply chain. Manthou et al. (2004) established the virtual e-chain of the supply chain collaboration, constructed the framework of supply chain collaboration in virtual environment, classified the relationship between collaborative partners, and distinguished the key abilities that constitute collaborative relationships, which achieved the expected collaboration. Peterson and Lora (2001) in Grartner company
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