Coordination Performance Evaluation of Supply Logistics in JIT Environment

Guo Li, Beijing Institute of Technology, China
Xiang Zhang, Beijing Institute of Technology, China
Zhaohua Wang, Beijing Institute of Technology, China
Tao Gao, Hebei Electronic Information Products Supervision and Inspection Institute and Industry and Information Technology Department of Hebei Province, China

ABSTRACT

In JIT assembly system, any supplier’s postponement of delivery or incorrect delivery quantity will result in the manufacturer’s incapability of assembling on schedule, which will not only damage the interests of other suppliers but also jeopardize the interests of enterprises and reduce the competitiveness of the supply chain. In this article, coordination of the upstream supply logistics from internal and external aspects is taken as the research object. In external supply system, three aspects of cost, quality and time are used to evaluate the coordination of supply logistics in JIT environment. From the internal aspect, reliability, flexibility, responsiveness, customer service and system suitability are selected for the performance evaluation. The eight indexes construct an index system and each performance index is described and analyzed. Finally, Analytic Hierarchy Process is used to evaluate the coordinated performance of supply logistics in JIT environment. An example is provided, which illustrate the method used in this paper is feasible and meaningful.

Keywords: Assembly System, Coordinated Performance, JIT Environment, Supply Logistics

1. INTRODUCTION

Coordination of supply chain management is a new mode, although its proposed time is not long. It has received a wide range of attention from academic circles and enterprise circles since proposed. For example, in 1995 the international well-known retailer Wal-Mart and others proposed the effective strategies oriented to coordination of supply chain management---Collaborative Planning, Forecasting and Replenishment (CPFR) (Bin & Zhang, 2000). In 1999, IBM developed its supply chain solutions, and constructed its collaborative supply chain (IBM, 2011). In 2002, the American consulting firm ARC proposed Collaborative Manufacturing Management (CMM) strategy.
based on collaborative value network and established the CMM model (ARC Advisory Group, 2002). Turkay, Oruc, Fujita, and Asakura (2004) constructed the model and made quantitative analysis between chemical industry enterprises. Akkermans, Bogerd, and van Doremalen (2004) established a theoretical model of supply chain collaboration, focusing on non-technical factors which affected the realization of coordination.

Currently, studies on coordination of supply chain management mainly involve three aspects: the strategic level, tactics level and technical level. Tactics level coordination is the main problem in coordination of supply chain management. The related details are as follows: demand collaborative tactics with a direct supply and demand relationship between the upstream and downstream business, product design collaboration tactics, collaborative inventory tactics, collaborative production tactics, collaborative logistics tactics, collaborative procurement tactics etc. Most scholars attach great importance to the coordination in tactics level, because supply chain coordination in tactics level is the core problem of the supply chain coordination (Ren, 2005).

Customer demand affects the supply chain coordination. Chen et al. (2000) analyzed that centralized demand information can reduce the “bullwhip effect”, but can’t completely eliminated it. Helo (2000) applied system dynamic simulation method to study amplified effect of the demand in supply chain, the role of capacity fluctuations and ability compromise. The results show that fewer orders for all levels of synchronization and capacity analysis can be used as the method for effective supply chain responsiveness.

Inventory problem has always been a typical problem in coordination of supply chain management. Therefore, it is also the core problem of supply chain coordination in tactics level. Fu and Piplani (2004) established the coordination model evaluated supply side based on inventory. Through modeling the traditional supply chain and collaborative supply chain respectively, the distributor’s performance before and after the collaboration is simulated. The results show that supply-side coordination can enhance the entire supply chain performance. Teruaki and Salleh (2000) modeled and analyzed the two echelon coordinated inventory control with random demand.

The research on production planning and cooperative control has achieved some results. Schneeweiss and Zimmer (2004) studied the coordination / integration plan of production and sales with emphasis on contribution of corporate earnings. Yang, Ma, and Li (2004) used two layer planning as the response time modeling method of collaborative planning in supply chain, and described in detail planning process that each node enterprise interior allocates production time and the logistics. Zhou and Wang (2001) studied supply chain production plan with Multi-location Plants and multiple distributors, and attempted to obtain the optimal production plan by system engineering, but this goal in the actual application is not reached. As for logistics coordination, Ellinger (2000) studied relationship between the internal supply chain marketing and logistics cross-functional coordination by analyzing the incentive mechanism, cross-functional collaboration, effective integration and service performance of marketing and logistics department.

There is so much literature about supply chain coordination, but these articles focus on the supply chain. As for the upstream assembly system, few scholars has studied. Now how to build a scientific supply logistics coordination evaluation system and objective measure logistics operation processes in the academic circle is still unsolved. From the actual situation of our manufacturing industry, due to the lack of readily available statistical index system, analysis of supply logistics statistics is very difficult. In the JIT environment, Supply coordination plays a vital role in the core manufacturing enterprises to ensure the normal production. Therefore, this article will establish index system for coordination of the supply logistics system in the JIT environment, and put forward a better evaluating method to improve coordination of supply logistics system, which can provide a powerful reference for decision making.
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