

Chapter 14

A Contemporary Approach to Plan Independent Logistics Actors

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ABSTRACT

Companies are dependent on the resources and information of other members of the supply chains. To manage their resources, companies use coordination mechanisms. Despite the inter-dependency between logistics actors, they are independent units with conflicting objectives. These two characteristics can increase the complexity of planning in logistics networks. According to the literature of supply chain management, some mechanisms largely use the information shared by members to achieve an optimal solution and some others are based on minimum level of information sharing. This chapter addresses the coordination problem in a logistics networks with more than two partners, while the information is in a private element that is not exchanged with other partners.

INTRODUCTION

The simplest form of the supply chain is a dyadic relationship in which exists only two business units, normally a seller and a buyer or a supplier and a manufacturer. Supply chains can also be defined as the networks of companies. These networks are complex systems which compose of numerous independent facilities connected through upstream and downstream linkages to produce value for clients by procuring raw materials, transforming raw materials into products, and distributing the final

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products to customers. The complexity of these networks may vary from industry to industry. The complexity also depends on the numbers of members in a network as well as the mode of information exchanged between these members.

The goal of supply network management is the coordination of interdependent plans. The objective of supply chain management is to contribute to the complexity of supply chains by proposing the different coordination mechanisms. According to Simchi-Levi and Kaminsky (2000) supply chain management is the integration of key business processes among networks of interdependent suppliers, manufacturers, distribution centers, and retailers in order to improve the flow of goods, services, and information from original suppliers to final customers, with the objectives of reducing system-wide costs while maintaining required service levels.

The integration of supply chain can be categorized into three levels (Lee, 2000). The first level is information integration when some essential information is shared between partners. As an example, sharing inventory status, capacity limits, production plans, financial results, demand forecasts, and transportation plans. The second level is the integration by sharing not only the information but also resources to achieve an optimal solution for all members of supply chain. Finally, the third level of integration is an organizational linkage by defining the common performance indicators as well as common incentive system. In these three integration levels partners could achieve an optimal solution because they have access to essential information necessary to optimize the mutual plans.

Despite producing the optimal solution to all partners, these types of integration are not practical when different companies are independents, and they do not want to share their critical information like inventory status, capacity limits, production plans, financial results, demand forecasts, and transportation plans. But not sharing the critical information can give rise to another problem. According to Lee et al. (1997), the lack of systematic exchange of critical information can give birth to the phenomenon of bullwhip effect, which is the amplification of demand variability as one moves upstream a supply chain.

The question, which is raised, is how operations in a supply chain can be coordinated when the partners decide not to integrate into none of above integration levels without having the problem of bullwhip effect.

To answer this main question non-integrated approaches of coordination are designed which respect the independent nature of each company and try to provide the near optimal solution to all partners of a supply chain. This research addresses the above question by introducing a contribution in the decentralized approaches of coordination, which is based on the limited exchange of information. Our objective is to coordinate a network of manufacturing units without any integration and just based on the minimum level of information sharing. We want to show that our approach can improve the result of upstream planning as a basic hierarchical

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