

Chapter 12

E-Supply Network: Network Agents to Support Information Sharing for Buyer– Buyer–Supplier Coordination

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ABSTRACT

Finding most promising suppliers based on consistency with the overall goals of buyers' companies is of great importance where different small buyers are dependent on large suppliers. Here, the authors attempt to model and implement an e-supply network considering the buyer-buyer-supplier triadic. This approach facilitates horizontal information exchange among buyers in sharing their experience and thereby buyers are inclined to find the most acceptable suppliers. Indeed, vertical information sharing among buyers and suppliers are considered in order to allocate the benefits of the mechanism to all partners while optimizing the network global objective function. The concept of discrepancy is first utilized to search for the most promising suppliers in the network based on the overall goals (exclusive attributes) of buyers and suppliers. Then, products' specific attributes (bilateral attributes) are used to sharpen the results. At the last step, a genetic algorithm is used by the network agent to coordinate the network. Ultimately, the authors utilize intelligent agents to simulate buyers' and suppliers' behaviors with the aim of evaluating the system. They find out that information sharing in supply networks can be effectively established if the barriers of information access and information effects are wisely defined.

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While the methodology of using information for coordination is still important, the definition of information structure, the way we acquire and maintain the information and the governing rules have critical roles in the success of the system. The agent technology has a key role here enabling the users to utilize the information effects while not having access to them directly.

INTRODUCTION

A supply chain is a dynamic information network comprised of many transactional entities, where the membership, the structure of the interaction, and the nature of network attributes as represented by informational flow change dynamically over time (Mahdavi et al., 2009b). Hence, for handling the interactions between the supply network partners efficiently, a largely automated information and trading network is needed (Gerber et al., 2003) which provides the supply network partners with information related to the network attributes including products, buyers and suppliers, and coordination services.

In the past decade, supply chains with multiple decision makers have begun to receive considerable interest due to the fact that independent entities in the supply chain acting in their own self-interest often make decisions that are sub-optimal. Consequently, the focus of supply chain management has been shifted from production efficiency to customer driven and partnership synchronization approaches in today's global competitive market. Within the field of operations management, research on the impact of information technology use on coordination has evolved from the study of overall buyer-supplier coordination (Vickery et al., 2003). The improvements in coordination among supply chain partners through the use of information technology are well documented (Frohlich, 2002; Balakrishnan and Geunes, 2004). Every member must be able to share information with trading partners and customers in real-time. New networked models are based on mutual trust, openness, shared risk and shared rewards aiming for business performance greater than the firms would achieve individually (Manthou et al., 2004).

While it is well-accepted by supply chain executives that information sharing and physical flow coordination can lead to enhanced supply chain performance (see La Londe and Ginter, 2004), the source, potential magnitude, and the allocation of the improvements across channel members are not clear (Sahin and Robinson, 2005). In addition, the internationalization and globalization of markets, the open networks and advances in information/communication technology, the service, and customer orientation of B2B and B2C sectors, as well as the emergence of the knowledge society, require new patterns of cooperation among suppliers, trading partners and customers in supply chain to successfully respond to the e-business demands (Manthou et al., 2004).

Generally speaking, coordination consists of horizontal coordination (Andersen and Christensen, 2005) and vertical coordination (Fiala, 2005). The vertical information sharing implies that the upstream (i.e., supplier) and downstream (i.e., buyers) participants of the supply chain share information. Thus, the suppliers have access to the collective information that is required to coordinate the supply chain and each buyer has also access to the suppliers' setups and holding cost information. Consequently, several studies have focused on designing a coordination mechanism in a two-echelon supply chain but few quantitative models and investigations are available exploring the mechanism to transfer the effect of interaction among buyers due to the coordination where they create coalitions and share their experience and information. On the other hand, in a web-based environment, the ability to rapidly identify suitable partners and effectively coordinate them through the net is crucial to the success of the supply network

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