Chapter 6.8
Fuzzy Electronic Supply Chain System:
Customer Satisfaction and Logistic Aspects

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ABSTRACT

A supply chain is a network of suppliers, factories, warehouses, distribution centers and retailers, through which raw materials are acquired, transformed, produced and delivered to the customer. An effective and efficient way of managing this network is called a supply chain management system. The authors' purpose here is to design a capable electronic supply chain system in an electronic market. The authors consider a supply chain composed of supplier, plant, and customer. The aim is to optimize a real time web-based fuzzy order-delivery system for which customer satisfaction is emphasized. As such, a comprehensive web-based order-delivery system in an electronic market is proposed and optimized applying fuzzy mathematical programming.

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INTRODUCTION

Being a complex network of suppliers, factories, warehouses, distribution centers and retailers, the success of any supply chain management system (SCMS) depends on how well the system components are managed (Zhao et al., 2008). In recent times, information has become a key player in determining the productivity of a complex enterprise. The enterprise's ability to process information and make rapid but right decisions promises growth. In such a scenario, it is necessary to forecast and estimate the demand, and supply raw materials to the point of sale locations and reorganize the business structure if necessary (Simchi-Levi et al., 2007). To realize these goals, a system must seamlessly integrate both information and material flow. Such a system can provide access to information, aid decision-making and execution (Halldorsson et al., 2007).

Supply chain management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer (Cooper et al., 1997). SCM involves coordinating and integrating these flows both within and among companies. It is said that the ultimate goal of any effective SCM system is to reduce inventory (with the assumption that products are available when needed). In competitive supply chain management systems, sophisticated software systems with Web interfaces are competing with Web-based application service providers (ASP) who promise to provide part or all of the SCM service for companies renting their services (Ketchen and Hult, 2006). Supply chain management flows can be divided into three main flows: the product flow, the information flow, and the finances flow.

The product flow includes the movement of goods from a supplier to a customer, as well as any customer returns or service needs. The information flow involves transmitting orders and updating the status of delivery. The financial flow consists of credit terms, payment schedules, consignment and title ownership arrangements. There are two main types of SCM software: planning applications and execution applications. Planning applications use advanced algorithms to determine the best way to fill an order. Execution applications track the physical status of goods, the management of materials, and financial information involving all parties. Some SCM applications are based on open data models that support the sharing of data both inside and outside the enterprise (this is called the extended enterprise, and includes key suppliers, manufacturers, and end customers of a specific company). This shared data may reside in diverse database systems, or data warehouses, at several different sites and companies. By sharing this data "upstream" (with a company's suppliers) and "downstream" (with a company's customer), SCM applications have the potential to improve the time-to-market of products, reduce costs, and allow all parties in the supply chain to better manage current resources and plan for future needs (Larson and Halldorsson, 2004). The SCM structure has significantly improved by use of Web-based software facilities. A number of major Web sites offer e-procurement marketplaces where manufacturers can trade and even make auction bids with suppliers (Haag et al., 2006).

E-Supply Chain Management (e-SCM) refers to the flow of physical goods and associated information from the source to the consumer (Tanriverdi, 2006). Key e-Supply chain activities include purchasing, materials management, distribution, customer service, and inventory forecasting. Effectively managing these processes is critical to the success of any online operation (Chen et al., 2007).

In commerce, a retailer buys goods or products in large quantities from manufacturers or importers, either directly or through a wholesaler, and then sells individual items or small quantities to the general public or end user customers, usually in a shop, also called store. Retailers are at the end of the supply chain (Lavassani et al., 2008b). Many shops are part of a chain: a number of simi-