Chapter 3.8

Supply Network Planning Models Using Enterprise Resource Planning Systems

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ABSTRACT

The advent of the Web as a major means of conduct-ing business transactions and business-to-business communications, coupled with evolving Web-based supply chain management (SCM) technology, has resulted in a transition period from "linear" supply chain models to "networked" supply chain models. Various software industry studies indicate that over the next five to seven years, interenterprise business relationships, information structures, and processes will evolve dramatically. Enterprises will blend internal production and supply chain processes with those of their external trading partners. Currently, organizations are finding creative ways to mitigate supply chain costs while maintaining operational efficiency. New approaches, technologies, and methodologies are aiding with these cost-cutting measures to drastically reduce supply chain costs and increase customer satisfaction. This chapter discusses the background of supply chain planning and execution systems, their role in an organization, and how they are aiding in collaboration. The chapter concludes with a case study on how a supply chain management system could help an organization be more effective.

INTRODUCTION TO ERP SYSTEMS

Enterprise resource planning (ERP) systems aim to integrate all business functions and data of an organization into a single integrated system. The main component of an ERP system is the use of a common database. A typical ERP system landscape consists of a variety of hardware and software to help integrate the business functions and data. The goal of an ERP system is to provide a unified

scheme to perform and record all the business activities of an organization and ensure organization, classification, and structure of the business processes and data.

An ERP system can be viewed as a group of processes, applications, and technology and consists of the following:

- Databases
- Applications to support business processes
- Network and systems infrastructure
- Middleware (group of software that aid integration of the various components)

This chapter discusses the evolution of ERP systems, provides brief information on the various ERP vendors and details the role and the impact of the integrated business software in manufacturing intelligence.

Evolution of ERP Systems

The concept of ERP has been around since the 1960s, and has its beginning in materials requirements planning (MRP). It was meant to provide an integrated approach to reduce inventory and process times and better manage procurement and production. In the 1970s, ERP systems evolved into manufacturing resource planning (MRP II) to involve financial and human resource planning in a limited capability. MRP and MRP II had their own limitations in terms of handling multiple locations, product aggregations, capacity constraints, and so forth. These limitations resulted in the development of ERP systems.

ERP systems, in the simplest sense, can be considered as a single, integrated database that gathers, stores, and helps analyze the data of an organization. Until the early 1990s ERP products were running on mainframes; however, with the advent of the client-server architecture in the mid-1990s, a majority of the ERP systems run on client-server architectures. The emergence of ERP systems went hand in hand with the idea of

concentrating on single enterprises. The primary goal of these systems was to integrate the business processes of a single company. The business process integration capabilities were also very limited even if multiple companies of a conglomerate used the same information system. Among the biggest hurdles for this integration was the cost of technology. However, with significant development in technology over the last 5-7 years, the idea of cross-enterprise integration has become achievable and affordable. This led to the next generation of integrated business software products, commonly referred to as ERP II.

ERP II is the latest evolution that adapts ERP to the e-commerce environment through changes in functionality, technology, and architecture. The most evident change from ERP to ERP II is a change in focus of a business process from enterprise-centric to a collaborative environment. ERP II extends the scope of the business processes from an individual organization to all the stake holders in the supply chain. According to the Gartner Group, ERP II is "a business strategy and set of industry-domain-specific applications that build customer and shareholder community's value network system by enabling and optimizing enterprise and inter-enterprise collaborative operational and financial processes" (Gartner Group, May 2001).

Table 1 represents the timeframe, industry needs, and the progress of technology of these systems.

Table 1. History of ERP systems

Year	Industry Need	Technology Progress
1970 - 1990	Real-time Automated systems	Automation systems, Transactional systems (OLTP)
Early 1990s	Scalable Integrated business processes	Analytical systems (OLAP), ERP
Late 1990s	Heterogeneous business processes	Integration, Web-services, "e-commerce"
2000s	Packaged composite business processes	ERP II

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