

## Enterprise resource planning systems and its implications for operations function

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### Abstract

Over the last decade, our world has changed dramatically due to the growing phenomenon of globalization and revolution in information technology. There is tremendous demand on companies to lower costs, enlarge product assortment, improve product quality, and provide reliable delivery dates through effective and efficient coordination of production and distribution activities. To achieve these conflicting goals, companies must constantly re-engineer or change their business practices and employ information systems.

In 1990s, Enterprise Resource Planning (ERP) systems have emerged as an enabling technology, which integrates various functional (operations, marketing, finance) information systems into a seamless suite of business applications across the company and thereby, allowed for streamlined processing of business data and cross-functional integration. Thus, ERP systems provide an enticing solution to managers who have struggles with incompatible information systems and inconsistent operations policies. However, successful implementation of ERP systems requires active participation from senior-level managers from various functional areas so as to delineate its impact on the business level as well as functional level strategies.

In this paper, we have endeavored to provide operations managers a brief overview of ERP systems and highlight its implications for operations function. Specifically, the objective of this paper is to give a broad based overview of enterprise resource planning systems. Using SAP R/3 as an example system, we discuss how an ERP system can assist in enhancing strengthening business strategy and making consistent operations decisions: process design, production planning and scheduling, inventory management, quality management, human resource management.

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“Elizabeth Benson, purchasing manager for Tristen, Inc., hung up the phone and turned quickly to her desktop computer. She had just received word of a fire in a manufacturing plant belonging to a key vendor... Both Benson and the vendor knew that if the situation were not dealt with quickly both Tristen and its auto manufacturing customer’s assembly lines would soon shut down for lack of parts...”

Benson’s first move was to generate an on-line report of resin inventory across all warehouses. This allowed her assess where shortages were most likely to occur. Next she assessed the manufacturing forecast for the next several days to analyze where product would be needed

and when. Using this information Benson generated materials movement requests to reallocate the resin across the organization. She also transmitted purchase order revisions to the vendor in order to reroute incoming resin shipments to appropriate locations.

No matter how good a job Tristen did in reallocating its own inventory, the battle would still be lost if the company’s other vendors ran out and were unable to supply Tristen with needed sub-components. By running a ‘where-used’ report across the Bills-of-materials for all the sub-components in the item database, Benson was able to generate a list of vendors that needed notification of the impending shortage. Checking again with the production plan Benson forecast each affected vendor’s resin needs so that appropriate supplies could be sent.

Still facing a shortage, Benson’s final step was to search the item database for alternative materials that could be

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used. Checking these alternatives against a list of approved vendors yielded several supply combinations. A quick cost rollup calculations allowed for vendor selection and the generation of purchase orders for immediate Electronic Data Interchange (EDI) transmission to the new sources. Three hours after she had begun Benson rested. In that short time she had managed to avert a disastrous plant shutdown, both for Tristen and its customers. Savings potentially ran into the millions of dollars...”

Escalle and Cotteleer (1999)

## 1. Introduction

Due to dynamism in the current borderless world market, companies are confronting new markets as well as new competition. Decision-making processes are requiring different time horizons and geographical dispersions. Consequently, decisions require quick changes regarding product developments, material flows, production planning, and scheduling. It is necessary for companies to evolve ways to keep operational efficiency at its peak, i.e. in terms of high levels of flexibility, dependability and quality. Consequently, matrix or decentralized organizational structure that crosses functional areas and encompasses a multitude of business processes is being adopted by many organizations. Compared to function-oriented hierarchical organizations where information transfer is inflexible and slow-a decentralized process oriented structure is where information flow is highly flexible, fast and disjointed (Keller, 1999).

Historically, companies had maintained different information systems for different business functions such as accounting, production, marketing, purchasing, etc. These legacy systems had their own methods and systems of collecting and storing information based upon their needs. Although these systems enabled managers to improve decision making within a specific functional area, these systems lacked functional integration and made communication and cooperation among business functions exceedingly difficult. Consequently, a company as a whole is losing its competitive edges because it is not able to realize its full potential.

In 1990s, companies implemented variants of ERP systems with a central/common database and standardized software to replace stand-alone legacy systems and to create necessary interface among functional areas. Conceptually speaking, ERP systems enable all functional areas ‘talk’ directly to each other and the data availability to all in real-time to prevent non-optimal decision making (Jacobs and Whybark, 2000). An important characteristic of ERP systems is the ability to implement it in modules. A company does not have to perform a full-scale implementation rather selective modules (where a module usually represents a functional area of an organization) can be

implemented based on the needs of a particular company (Gupta, 2000). Some of the most important reasons companies implementing ERP systems cite are to improve the level of systems integration, and to standardize as well as improve processes.

The belief that ERP implementation leads inevitably and automatically to improved operations has become something of a universal paradigm in the corporate world. With the projected growth of the ERP market at 66.7 billion dollars by 2003 from 16.7 billion dollars in 1998, most Fortune 500 companies have already adopted ERP systems and many midsize companies are planning ERP implementations. Clearly, ERP systems have significant implications for all functional areas of a company. From an operations manager’s perspective, if implemented successfully and fully comprehended by managers, such systems can go a long way to help operations managers in decision-making process. As seen in the Introduction, Escalle and Cotteleer (1999) provided a hypothetical but excellent example of the capabilities of a successfully implemented ERP system to demonstrate its usefulness to operations managers.

The purpose of this paper is to demonstrate how ERP systems can be used as an enabling technology or tool to improve operations performance, i.e. to enable operations managers in their decision making process. More specifically, this paper provides an overview of enterprise resource planning systems, i.e. what it is and what its strategic relevance is, and demonstrates how it assists operations manager in developing consistent business/operations strategies and in making consistent set of decisions, such as product/process design, quality management and control, production planning and scheduling, and inventory management.

The rest of the paper is organized as follows. In the rest of this section, we discuss the evolution of ERP systems to show that operations planning and inventory management were at the root of its inception and briefly discuss main characteristics of various commercially available ERP systems. In Section 2, we suggest that ERP system as an enabling information technology should support company’s business strategy and thereby, strategies of the functional areas in a consistent manner. In this section, we use a specific ERP system, i.e. SAP/R3 as an example to highlight how various modules can enhance operations decision-making process. In the third section, we discuss an example of how ERP system modules can be implemented to make operations decisions in an integrated manner and provide some insights on the selection of a specific ERP system. Finally, we conclude our paper with some discussion on the future of ERP systems by citing its role in integrating companies across the supply chain.

### 1.1. ERP Evolution

The foundation for ERP started with the concept of inventory control in the 1960s. Based on traditional

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