Chapter 1.6
An Overview of Enterprise Resource Planning for Intelligent Enterprises

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INTRODUCTION

Enterprise resource planning systems can be defined as customizable, standard application software which includes integrated business solutions for the core processes and administrative functions (Chan & Rosemann, 2001). From an operative perspective, ERP systems provide a common technological platform unique for the entire corporation allowing the replacement of mainframes and legacy systems. This common platform serves to process automation as well as to simplify current process either by an explicit reengineering process or by the implicit adoption of the system "best practices" (Markus & Tanis, 2000). Finally, the common centralized platform allows the access to data that previously were physically or logically dispersed. The automation of the processes and the access to data allows the reduction of operating times (thus reducing operating costs) while the latter serves to a better support of business decisions (see e.g., Umble, Haft & Umble, 2003 for a detailed review of ERP benefits). ERP is considered to provide businesses with new opportunities to acquire knowledge (Srivardhana & Pawlowski, 2007), being the sources of knowledge the aforementioned best practices from the ERP, and the ERP software company's staff during the implementation phase.

At present, ERP systems are either used or implemented in a large number of enterprises. According to Genoulaz and Millet (2006), up to 74% of manufacturing companies and up to 59% of service companies use an ERP system. In addition, more than 70% of Fortune 1000 companies

have implemented core ERP applications (Bingi, Sharma, Godla, 1999; Yen, Chou & Chang, 2002). The objectives for implementing an ERP system can be classified as operational, strategic, dual (operational plus strategic), or without objective (Law & Ngai, 2007). The adoption of an ERP system with operational objectives is aimed at improvement operating efficiency together with the reduction of costs, while companies implementing ERP with a strategic objective would experience a change in business processes, improving sales and market expansion.

A widespread critique to ERP systems is their high total cost of ownership (Al-Mashari, Al-Mudimigh & Zairi, 2003) and hidden costs in implementation (Kwon & Lee, 2001). Besides, ERP systems impose their own logic on an organization's strategy and culture (Davenport, 1998), so ERP adopters must adapt their business processes and organization to these models and rules. Consequently, organizations may face difficulties through this adaptation process which is usually carried out without widespread employee involvement. This may cause sore employees, sterile results due to the lack of critical information usually provided by the employees; and also late delivery, with reduced functionality, and/or with higher costs that expected (Kraemmeraard, Moeller & Boer, 2003). Additionally, some analysts have speculated that widespread adoption of the same ERP package in the same industry might lead to loss of competitive advantage due to the elimination of process innovation-based competitive advantage (Davenport, 1998). This has been observed, for instance, in the semiconductor manufacturers sector (Markus & Tanis, 2000).

The early stage of ERP was carried out through Materials Requirement Planning (MRP) systems (Umble, Haft & Umble, 2003). The next generation of these systems, MRP II (Manufacturing Resources Planning), crossed the boundaries of the production functionality and started supporting not only manufacturing, but also finance and marketing decisions (Ptak & Schragenheim, 2000). Cur-

rent ERP systems appeared in the beginning of the 1990's as evolved MRP II, incorporating aspects from CIM (Computer Integrated Manufacturing) as well as from EDP (Electronic Data Processing). Therefore, ERP systems become enterprise-wide, multilevel decision support systems. ERP systems continue evolving, incorporating Manufacturing Execution Systems (MES), Supply Chain Management (SCM), Product Data Management (PDM), or Geographic Information Systems (GIS), among others (Kwon & Lee, 2001).

BACKGROUND

Most enterprise resource planning systems share a number of common characteristics, both from a technological as well as a business perspective. These include:

- **Client/server, open systems architecture**. Most ERP packages adopt an open systems architecture that separates data (database server), application (ERP server), and presentation (user interface/ERP client) layers, guaranteeing cross-platform availability and systems integration (Basoglu, Daim & Kerimoglu, 2007). In order to interoperate with existing business applications or information systems, most ERP adhere to the majority of common standards for data exchange or distributing processing.
- **Enterprise-wide database**. One of the most distinguishable characteristics of ERP is the strong centralization of all relevant data for the company (Al-Mashari, Al-Mudimigh & Zairi, 2003). When physical centralization is not possible, communication and/or replication protocols among the different databases should be implemented in order to ensure data consistency and accessibility throughout the entire enterprise.

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