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The ERP Purchase Decision: Influential Business and IT Factors

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Abstract

Our objective for this paper is to identify a parsimonious set of business and IT factors that are associated with the purchase of ERP systems. A survey instrument of 36 items that describe potential ERP package capabilities is developed after a review of prior literature. Based on factor analyses of the survey responses from 122 senior IS managers, four business factors (data integration, new ways of doing business, global capabilities, flexibility/agility) and four IT factors (IT purchasing, IT cost reduction, IT expertise, IT architecture) are identified. We also confirm that many of the ERP purchases in the last half of the 1990s were at least partially motivated by the avoidance of Year 2000 maintenance costs.

Introduction

Over the past decade, the types of system solutions being implemented in many manufacturing and service organizations have changed significantly (Lucas et al., 1988; Ragowsky et al., 1996; Ragowsky and Stern, 1997; Sawyer, 2000). Rather than developing and maintaining customized mainframe applications for single business clients, IS professionals are now frequently involved in the implementation of large-scale, cross-functionally integrated, packaged systems known as enterprise resource planning systems (ERPs). ERP systems are on-line, interactive systems that support cross-functional processes and data integration. Since the mid-1990s, these packages have been implemented on client-server architectures. Companies may choose to implement just one ERP module for a specific function, or an entire suite of modules. Van Everdingen et al. (2000), for example, found that 13% of mid-sized European company purchases of ERP software were for just one functional area, although the majority of companies (70%) purchased an ERP for more than three "functional areas." Further, the adoption of an ERP often involves large-scale organizational changes with third-party consulting costs ranging from two to ten times the purchase price of the ERP software (Batz, 1996).

By 1995, these so-called "mega-packages" had been introduced into a range of industries, including the aerospace, financial services, healthcare, and high-tech industries, in addition to manufacturing firms. By 1997, five major vendors of ERP software for client-server architectures had emerged (Edmondson, 1997). The

largest market share is currently held by SAP AG; other major providers include Oracle, Baan, PeopleSoft, and J.D. Edwards. To make their products easier and less costly for mid- and small-sized firms to implement, vendors are introducing rapid implementation methodologies, as well as specific industry solutions.

The study reported here is one part of a multi-year empirical study of ERP purchase and implementation issues. Our objective for this paper is to identify a full but parsimonious set of factors that reflect the range of business-and IT-related capabilities associated with the purchase of ERP systems. Despite widespread ERP investments, only a few field studies have investigated ERP selection criteria (Bernroider and Koch, 1999; Van Everdingen et al., 2000). We therefore view the identification of a set of factors that describe ERP package capabilities as a first step toward better understanding the benefits expected by organizations that choose to adopt an ERP solution. Our overall research question for this paper is: *What ERP package capabilities are associated with the purchase of an ERP?*

Overall Research Model and Relevant Literature

The research model for our larger study of ERP package selection decisions is presented in Figure 1. Our overall research approach is a holistic one: our assumption is that multiple organizational and ERP package characteristics are important for understanding a given firm's purchase decision. This study reports the results of the first stage of our study: the identification of ERP package capabilities that influence ERP purchase decisions.

We began this investigation by examining anecdotal episodes that appeared in practitioner journals such as *I/S Analyzer*, *CIO*, and *Information Systems Management* beginning in the mid-1990s. We also re-familiarized ourselves with articles on related technology topics (e.g., client-server applications, packaged software selection and implementation). Further, we increased our knowledge by on-site visits to companies that had adopted ERPs. One of our early learnings from the field was that ERPs may be implemented for essentially two quite different purposes, a distinction not well addressed in the practitioner literature. Based on the discussion of primary and secondary activities by Porter and Millar (1985), we adopted the following terminology:

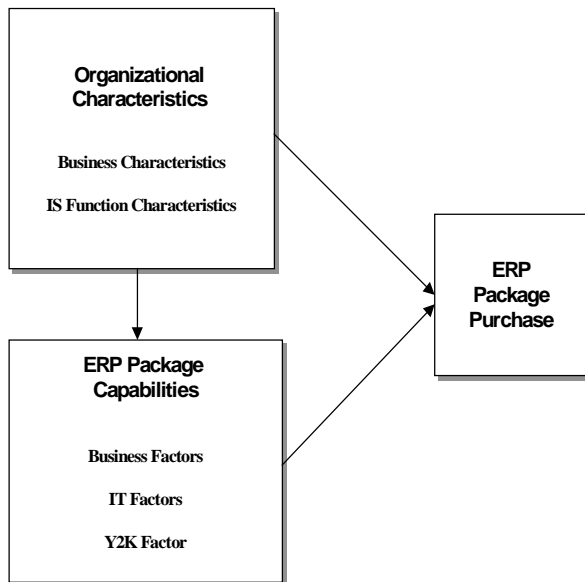


Figure 1. ERP Package Purchase Decision

- *Support ERP purchases* involve human resources and/or financial/accounting modules, alone.
- *Value-chain ERP purchases* involve materials management (purchasing and inventory management), production and operations, and/or sales modules, but may also include the purchase of one or more support modules.

Our initial inquiries also revealed that companies have both business and technical reasons for implementing such packages.

Business Capabilities of ERP Packages

The literature of the second half of the 1990s suggests three business capabilities that influence ERP purchases: the ability to better meet various competitive goals, the desire to reengineer business processes, and access to integrated data. ERP packages are associated with increased business flexibility (Bancroft et al., 1998) and with enabling organizations to achieve competitive goals not possible with their legacy systems (Norris et al., 1998). Among the competitive advantages associated with ERPs are the ability to make faster responses to business change (Bancroft et al., 1998; Welti, 1999), reduced cycle times and consolidated ordering, improved marketplace agility, and workforce empowerment (Levis and von Schilling, 1994; Markus and Tanis, 2000). In addition, the standard platform and multi-currency/multi-lingual capabilities of these packages have been associated with improved strategic capabilities (Batz, 1996) such as faster integration of new acquisitions. More recently, interorganizational e-commerce initiatives

have been emphasized, although these capabilities appeared after the development of our survey.

ERP systems support a process-oriented view of the business: they enable firms to implement cross-functional processes that eliminate functional silos of the past. In the early 1990s, many businesses underwent business process reengineering initiatives only to reach the conclusion that their current systems could not support their BPR efforts. Current wisdom suggests that companies should design their "to be" processes with the target package in mind (Champy, 1997); in other words, the business should be matched to the software rather than vice versa. Implementing an ERP therefore enables an organization to simultaneously reengineer business processes and replace legacy systems (Norris et al., 1998; Doane, 1998). Further, organizations seek to adopt an ERP because of the "best practices" that vendors embed in their packaged solutions (Bancroft et al., 1998), including the "best practices" identified for specific industries. ERP packages also enable organizations to deploy common processes across business units as well as globally (Batz, 1996; Bancroft et al., 1998; Curran and Keller, 1998; Fryer, 1999; Keller and Teufel, 1998; Koch, 1996).

Finally, ERP packages use a (logically) single database, either centralized or distributed, which provides access to enterprise-wide data across geographic and business unit boundaries. Because the system is fully integrated, the data are updated in real-time and an ERP therefore provides more effective information for both operations and decision-making (Batz, 1996; Bancroft et al., 1998; Doane, 1997; Fryer, 1999; Koch, 1996).

IT Capabilities of ERP Packages

The literature of the second half of the 1990s suggests three IT capabilities that influence ERP purchases: the desire to replace aging mainframe systems with more modern, enterprise-wide client-server architectures, replacement of legacy systems that no longer meet the firm's needs, and the desire to reduce information systems costs by buying rather than building software (Wagle, 1998).

Beginning with SAP's R/3 package in 1992, ERP packages became a means for moving a company from a centralized (mainframe-based) architecture to a client-server architecture. Client-server architectures have been touted as a "modern" enterprise-wide infrastructure (I/S Analyzer, May 1995; Levis and von Schilling, 1994) that results in a more flexible, scalable infrastructure (Doane, 1997; Levis and von Schilling, 1994; SAP OnLine Forum, 1996). Client-server systems may also be viewed as less costly operational solutions than aging mainframe systems (Davenport, 1998; I/S Analyzer, April 1992; I/S Analyzer, May 1995; Koch, 1996; Levis and von Schilling, 1994; Markus and Tanis, 2000; Norris et al., 1998).

Substantial benefits also appear to be associated with replacing existing in-house systems that are not meeting current business requirements (I/S Analyzer, May 1995). Further, organizations may view ERP systems as providing cheaper application solutions than operating and maintaining aging mainframe systems (I/S Analyzer, April 1992; I/S Analyzer, May 1995; Koch, 1996; Lewis and von Schilling, 1994; Markus and Tanis, 2000).

Organizations also choose to adopt an ERP because purchasing packaged solutions and their upgrades results in both time and cost savings (Lozinsky, 1998) compared with developing and maintaining in-house customized solutions. That is, "buy" vs. "build" is cheaper (Bancroft et al., 1998).

By the latter part of the 1990s, another benefit associated with ERP systems became apparent: avoiding Year 2000 problems (Bancroft et al., 1998; Fryer, 1999; Markus and Tanis, 2000; Norris et al., 1998; Slater, 1999). By adopting an ERP, companies could significantly improve their information systems capabilities at the same time as solving their Y2K problems. The revenues (and stock prices) of ERP vendors decreased in 1998 as it became too late to invest in an ERP solution to avoid Y2K remediation efforts, but by mid-1999 had started to rise once again.

Research Methodology

A survey instrument to capture ratings from senior IS managers on the extent to which various business and IT-related ERP package capabilities influenced a major ERP purchase decision in their organizations was developed for this study. Based on the available published literature, we identified 35 ERP package capability items and then grouped them into six categories: competitive goals, business processes, architecture, legacy systems, buy versus build, and data access. A single item measuring the extent to which the largest ERP purchase was a Y2K decision was included with other items under the legacy systems category.

The initial section of the survey collected data on the respondent, the organization's ERP purchase status, organization size, and industry. The respondents were then asked to identify the ERP vendor and modules purchased for their organization's "largest ERP purchase decision," followed by up to one additional ERP package purchase. Respondents were then asked to rate the extent to which each of the 36 items influenced their organization's largest ERP purchase decision using the same 7-point scale (1=very little, 4=moderate, and 7=a great deal). This survey design ensured that all respondents were using a similar referent. Based on an "expert review" process, the presentation and wording of several items were revised.

Our target respondents were identified from two primary sources: 1) professional organizations with which one or more of the researchers had interacted; and 2) contact information on potential ERP-adopting

companies provided by the publishers of the *Directory of Top Computer Executives*. During 1998-99, we solicited responses from ERP adopters in three waves of survey mailings to a total of 887 target respondents, which yielded a total of 122 usable responses for the factor analyses (14% response rate).

Results and Implications

The characteristics of our sample and detailed results from our factor analyses will be shared with the conference attendees. Four business factors (data integration, new ways of doing business, global capabilities, flexibility/agility) and four IT factors (IT purchasing, IT cost reduction, IT expertise, IT architecture) were identified. We also confirmed the importance of avoiding Y2K problems for purchases between 1996 and 1999. Our next step is to test for differences in the package capabilities sought between support and value-chain ERP purchases.

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