Critical Success Factors of ERP Implementation

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INTRODUCTION

An enterprise resource planning (ERP) system is an integrated set of programs that provides support for core organizational activities, such as manufacturing and logistics, finance and accounting, sales and marketing, and human resources. An ERP system helps the different parts of an organization share data and knowledge, reduce costs, and improve management of business processes. In spite of their benefits, many ERP systems fail (Stratman & Roth, 1999). Implementing an ERP system is a major undertaking. About 90% of ERP implementations are late or over budget (Martin, 1998), and the success rate of ERP systems implementation is only about 33% (Zhang et al., 2003).

Over the past few years, limited research has been conducted about ERP implementation issues: mainly, case studies in individual organizations have been reported. A major problem with such ERP case studies is that very few implementation failures have been recorded in the literature, and thus, the reasons why implementations fail are not known to practitioners and researchers. That is a motivation toward conducting empirical studies to explore critical factors that affect ERP systems implementation. A recent summary of ERP literature stated that research of critical success factors (CSFs) in ERP implementation is rare and fragmented (Nah, Lau, & Kuang, 2001). The idea of identifying CSFs as a basis for determining the information needs of managers was popularized by Rockart (1979). CSFs are those factors that are critical to the success of any organization, in the sense that, if objectives associated with the factors are not achieved, the organization will fail—perhaps catastrophically (Rockart, 1979). In the context of ERP project implementation, CSFs represent the essential ingredients, without which a project stands little chance of success. This study examines the CSFs for implementing ERP systems in Venezuela. Managers from seven corporations, who were identified as having key roles in ERP systems implementation, were surveyed in order to assess empirically which CSFs are critical in leading a successful implementation of ERP systems in Venezuela. This article is organized into four sections. First, ERP-related literature is reviewed.

The next section introduces the research methodology, followed by presentation of the results. The article ends with the conclusions and implications for future research and practice.

BACKGROUND

Implementing an ERP system is not an easy task. It can cause dramatic changes that need to be carefully administered if the potential advantages of an ERP solution (Al-Mudimigh, Zairi, & Al-Mashari, 2001) are to be gained. In some well-documented cases, spectacular results have been achieved (Johnston, 2002). There is, on the other hand, a relatively high failure rate: it was reported that three-quarters of ERP projects were judged to be unsuccessful by the ERP implementing firms (Kyung & Young, 2002). Also, failures are much less extensively documented. As a result, pitfalls to be avoided tend to be less well known. Venezuelan companies are just starting to use ERP systems. They started applying ERP concepts late in the 1990s. Because of the complex and integrated nature of ERP, and the large investment involved, it is imperative for organizations to study the experiences of others and to learn from their practices and success factors (Zairi et al., 2000). Identifying CSFs relevant to local companies is one way to increase the chances of a successful local implementation (Sum, Ang, & Yeo, 1997).

A literature review was conducted to understand the CSFs in successful ERP implementations. The review covered numerous articles (Bingi, Sharma, & Godla, 1999; Esteves & Pastor, 2001; Falkowski et al., 1998; Holland & Light, 1999; Nah, Lau, & Kuang, 2001; Rosario, 2000; Stefanou, 1999; Sumner, 1999; Wee, 2000). The literature varies according to the variables required for implementation success, so there is no general consensus as to the factors that are key to success in ERP implementation. It is probably a combination of factors that is important in explaining ERP implementation success (Zhang et al., 2003). From the review, 20 factors emerged as critical to the successful implementation of ERP systems. They were obtained after careful analysis and grouping of related subfactors:

1.   Top management support
2.   User training
3.   Use of consultants
4.   User participation
5.   Vendor package selection
6.   Use of steering committee
7.   Discipline and standardization
8.   Minimal customization
9.   Use of vendor's development tools
10. Best people full time
11. Technical and business knowledge
12. Implementation approach
13. Clear goals, focus, and scope
14. Business process reengineering
15. Project management
16. Effective communications
17. Presence of a champion
18. Interdepartmental cooperation and communication
19. Management of expectations
20. Vendor/customer partnership

RESEARCH METHODOLOGY

The choice of an appropriate research methodology is critical in guiding researchers on how best to meet research objectives. In this study, the purpose was to discover the perceptions and experiences of companies using ERP systems in Venezuela, and to use that information as the basis of data collection. The analysis has enabled the identification CSFs of ERP systems implementation in Venezuelan companies.

The targets of the study were the organizations that implemented ERP systems successfully. The key informant method was used for collecting information in a social setting by surveying (or interviewing) a selected number of participants. Seven firms were identified from the list provided by ERP vendors. We contacted the ERP project managers in charge of ERP implementation of each company. About 100 questionnaires were sent to the ERP project managers of each firm, who forwarded the questionnaires to the project team members in charge of individual processes. A total of 72 questionnaires were returned, of which 69 were valid.

The questionnaire consisted of two main parts: the company background and the CSFs. The first part was designed to determine characteristics such as size of the company, type of industry, location of company, etc. The second part consisted of 20 statements about the success factors of ERP systems implementation derived from the literature review. The language used in the survey was Spanish. Translation was easy, because Venezuelans used original English terms for many technical and man-

agement concepts and especially for information systems and computing concepts.

Participants were requested to rate the importance of each CSF using a five-point Likert scale, where a score of 5 indicated "extremely critical," and a score of 1 indicated "not critical." This method was employed on the grounds that a rating method avoids the problem of having to consider 20 CSFs simultaneously in order to rank them. The data collected were then analyzed by using SPSS. Based on the responses, descriptive statistics, factor analysis (FA), and reliability tests were carried out to identify the CSFs for the successful implementation of ERP systems and data validity, respectively.

RESULTS

Ranking

The importance rating of the 20 CSFs is listed in Table I. The individual mean value of the Likert rating scale is the popular usage indicator for measuring an item's importance, without regard to the other items; therefore, the higher the value, the more important the factor. Most items are rated above the 3.0 scale (midpoint). The three most important factors, in order of declining importance, are top management support, presence of a champion, and project management, with a mean value ranging from 4.80–4.64. Just as the literature argues, these are key items for ERP implementation management (Johnston, 2002). Conversely, use of steering committee, business process reengineering, and use of vendor's development tools, are the three items lowest in the list, with a mean value ranging from 2.95–2.06.

Factor Analysis

In an attempt to reduce the number of items (CSFs), and to understand their underlying structure, a factor analysis (FA) was performed. FA is a data reduction technique that uses correlations between data variables. The underlying assumption of FA is that a number of factors exist to explain the correlations or interrelationships among observed variables (Chatfield & Collins, 1992). For the present study, FA was performed on all 20 variables using principal components extraction (Tabachnick & Fidell, 1989). The goal of this method is to extract maximum variance from the data set within each factor. It is basically used to reduce a large number of variables to a smaller number of components. The measure of sampling adequacy for the 20 items was 0.87, indicating that the items were suitable for factoring (Kaiser, 1974).

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