Examining the critical success factors in the adoption of enterprise resource planning

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Abstract

This paper presents a literature review of the critical success factors (CSFs) in the implementation of enterprise resource planning (ERP) across 10 different countries/regions. The review covers journals, conference proceedings, doctoral dissertation, and textbooks from these 10 different countries/regions. Through a review of the literature, 18 CSFs were identified, with more than 80 sub-factors, for the successful implementation of ERP. The findings of our study reveal that 'appropriate business and IT legacy systems', 'business plan/vision/goals/justification', 'business process reengineering', 'change management culture and programme', 'communication', 'ERP teamwork and composition', 'monitoring and evaluation of performance', 'project champion', 'project management', 'software/system development, testing and troubleshooting', 'top management support', 'data management', 'ERP strategy and implementation methodology', 'ERP vendor', 'organizational characteristics', 'fit between ERP and business/process', 'national culture' and 'country-related functional requirement' were the commonly extracted factors across these 10 countries/regions. In these 18 CSFs, 'top management support' and 'training and education' were the most frequently cited as the critical factors to the successful implementation of ERP systems.

1. Introduction

The enterprise resource planning (ERP) system is a generic term for a broad set of activities supported by multi-module application software that helps organizations to manage their resources [77]. The ERP system has been shown to be able to provide significant improvements in efficiency, productivity and service quality, and to lead to a reduction in service costs as well as to more effective decision-making.

ERP began in the 1960s as material requirements planning (MRP) and, later, developed into a more advanced system called MRP II. Nowadays, the latest generation of ERP systems is more advanced and more effective in dealing with multiple business units including sales and operations planning, inventory/materials management, manufacturing, purchasing, order processing, accounting and finance, human resources, customer relationship management, and more. Given a wide

range of benefits in terms of functionality, many businesses believe the ERP system can deliver strategic competitive advantages. Therefore, it is not surprising that many organizations have already adopted ERP systems [81].

However, the implementation of ERP is a complex exercise, and many adopters have encountered problems in different phases [45,87]. In fact, many cases of the failure to implement ERP because of either cancellations or cost/time overruns have been reported [35,62]. The high failure rate in the implementation of ERP calls for a better understanding of the process [67]. In order to reduce the failure rate of ERP implementation, a number of studies have attempted to identify the critical success factors (CSFs) in the implementation of ERP.

Bullen and Rockart [14] have defined CSF as 'the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department, or organization. CSFs are the few key areas where "things must go right" for the business to flourish and for the manager's goals to be attained'. CSFs for ERP implementation bring a concept that helps an organization identify the critical issues that affect the process of implementation. Through a

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better understanding of the CSFs for the implementation of ERP, an organization can determine the corresponding solution to eliminate or avoid the most common causes of failure in implementation.

Although a number of empirical and non-empirical studies have addressed a variety of CSFs for ERP implementation, different studies have produced different sets of factors. For instance, Holland and Light [28] proposed a CSF model with strategic and tactical factors based on an analysis of eight companies. Al-Mashari et al. [5] developed a taxonomy of CSFs for ERP implementation through a comprehensive literature review combining research studies and organizational experiences. The taxonomy is comprised of various success factors from five perspectives: (1) setting-up, (2) implementation, (3) evaluation, (4) ERP success, and (5) ERP benefits. Somers and Nelson [69] identified a list of 22 CSFs associated with ERP implementation and analyzed the importance of these factors in different phases of implementation. Nah et al. [50] attempted to group related sub-factors to form 11 CSFs through a review of 10 articles in the area of information systems (IS) that were selected from a search through databases of published works and conference proceedings. Later, they added two more articles to their review, and these 11 CSFs were evaluated by the Chief Information Officers from Fortune 1000 companies [51]. They showed that top management support, project champion, ERP teamwork and composition, project management, change management programme and culture were the most critical to the successful implementation of EPR. Hence, there is no general agreement on which set of factors are the key to success in ERP implementation [88].

One possible reason why different factors were generated is that these studies were based on different samples and research settings, which may have placed more emphasis on some CSFs but less on others. This may explain why different studies have reported different subsets of CSFs rather than a comprehensive set of similar factors. In addition, the researchers conducted their research in different countries or territories. Cultures, government regulations, and economic environments differ among countries, a fact that raises some issues and challenges for ERP implementation [30,42,64]. Huang and Palvia [30] compared ERP implementation issues in advanced and developing countries. They showed some of the problems, issues, and characteristics currently faced in the implementation of ERP in developing countries. Livermore and Ragowsky [42] distinguished between ERP implementation patterns in two countries based on their cultures and styles of decision-making. Sheu et al. [64] pointed out that the differences in language, culture, politics, government, regulations, management style, and labour skills have an impact on ERP implementation practices in different countries.

Numerous CSFs for the implementation of ERP were found scattered across various studies. Meanwhile, some researchers have emphasized that the issues involved in the implementation of ERP differ in different countries. Regarding this point of view, two relevant questions may arise. Are the CSFs for the implementation of ERP the same across countries? Do the ERP adoption cases reported in the various countries differ in

performance with respect to certain CSFs? So far, little work has been done to reveal and systematically categorize the CSFs for ERP implementation, and to classify these according to different countries. The aims of this study are: (1) to identify the CSFs through a comprehensive and systematic literature review; (2) to group the related sub-factors into a common set of CSFs based on Nah et al. [51]; and (3) to report and analyze the identified CSFs and the performance of ERP cases in the CSFs across countries/regions.

This paper is organized as follows. Section 2 describes the research method. Section 3 reports the identified CSFs for ERP implementation based on the findings from the selected articles. The differences in the focuses and performance in the CSFs of the reviewed ERP implementation cases in various regions and countries are discussed in Section 4, in which a model of the country-related CSFs, vendor-related CSFs and organizational-related CSFs affecting ERP implementation is also presented with propositions for further research. The final section concludes the paper.

2. Methodology

A comprehensive search through the relevant literature was conducted in 2006 and 2007. In this study, articles from journals, conference proceedings, doctoral dissertations, and textbooks were identified, analyzed, and classified. Since ERP is a relatively new topic and we only focus on the CSFs for the implementation of ERP, it was necessary to search through a wide range of studies from different sources. The scope of the search was not limited to specific journals, conference proceedings, doctoral dissertations, and textbooks. Management, IT, and IS are some common academic disciplines in ERP research. Consequently, the following online journals, conference databases, and dissertation databases were searched to provide a comprehensive bibliography of the literature on ERP: ABI/INFORM database, Academic Search Premier, ACM Digital Library, Association for Information Systems eLibrary, Business Source Premier, Emerald Fulltext, IEEE Xplore, Hong Kong PolyU Library Catalogues, ProQuest Digital Dissertations, and Science Direct. The literature search was based on the descriptors, 'enterprise resource planning' and 'success factors'; while the time frame was based on the availability of the resources in these online databases.

An initial search through the literature yielded more than 299 articles. The full text of each article was reviewed to eliminate those articles that were not actually related to CSFs for the implementation of ERP. Many of the articles were excluded because they did not meet the following selection criteria:

- Only empirical studies published in English that followed either a quantitative or qualitative approach, with an explicit description of where the research was conducted and how the CSFs listed for ERP implementation were selected.
- In order to avoid duplication, in the case where conference proceedings with the same sources and results were published in more than two different volumes, only the one with the