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Critical Success Factors for the Implementation of an Enterprise Resource Planning System

Kyriaki Georgiou and Kyriakos E. Georgiou

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The implementation of an Enterprise Resource Planning (ERP) system is a very complex and expensive project that places tremendous demands on an organization's time and resources. However, the ERP market is growing fast in recent years showing that the demand for ERP systems is increasing since it provides an integration of the organization's strategy, structure and business processes with the information technology system aiming to empower the organization's effectiveness and efficiency. A review of the literature revealed that Clear Goals and Objectives, Top Management Support, Business Process Reengineering, Project Management, Project Team Commitment and Composition, Communication, Customization, Change Management, and User Training and Education are the most critical success factors (CSFs). The primary research carried out has confirmed these CSFs and also revealed that the collection and analysis of requirements is also a CSF for which limited attention was paid in previous research.

Keywords: Business Strategy, Critical Success Factors, Enterprise Information Systems, ERP.

Introduction

During the last decade ERP systems have received significant attention by both the academic and professional worlds. The literature review depicts that there are many success and failure stories and much have been written on ERP implementation in organizations of various sizes and in different parts of the world. This research conducted a comprehensive literature review that aimed to list the critical success factors examined based on their importance and frequency of use and compare them with the findings revealed from a case study that utilizes the qualitative research method approach. This review of the literature revealed that Clear Goals and Objectives, Top Management Support, Business Process Reengineering, Project Management, Project Team Commitment and Composition, Communication, Customization, Change Manage-



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“ During the 1990s, Enterprise Resource Planning (ERP) systems became the *de facto* standard for the replacement of legacy systems ”

“Today, information systems should use formalized procedures to provide the management at all levels in all functions with appropriate information based on data from both internal and external sources”

ment, and User Training and Education are the most commonly extracted factors by researchers and the research suggest that these critical success factors are very well validated by the case study. The research has also revealed the collection and analysis of requirements as a critical success factor for which limited and insignificant research is identified through the literature review.

Davenport [8] states that maintaining many different computer systems leads to enormous costs for storing and rationalizing redundant data, for re-keying and reformatting data from one system for use in another, for updating and debugging obsolete software code, for programming communication links between systems to automate the transfer of data. During the 1990s, ERP systems became the de facto standard for the replacement of legacy systems [15]. Somers and Nelson [35] claim there are numerous reasons for the increasing demand of ERP systems such as competitive pressures to become a low-cost producer, expectations of revenue growth, ability to compete globally and the desire to re-engineer the business.

Markus and Tanis [23] explain that ERP systems are rich in terms of functionality and potential benefits. Nash [27,28] state that effective business strategy centers on an aggressive efficient use of information technology; for this reason ERP systems have emerged as the core of successful information management and the enterprise backbone of the organization.

Today, information systems should

use formalized procedures to provide the management at all levels in all functions with appropriate information based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible [21].

Research Methodology

In-depth interviews with senior management, vendors, project managers, key users and end users were conducted in order to have a holistic view of the previous experience and lessons learned. During the data collection special attention was given to ascertain the validity of data and also in order to capture the interviewees' opinion concerning the research questions. The interviews were analyzed for recurrent issues and content analysis to highlight and underline the impact of CSFs to the success of the project and identify possible areas of improvement in the organization regarding future implementation process.

According to [26] research regarding information system implementation is best carried out through qualitative research. An interpretive approach is most appropriate in this case since the research is conducted in an area where there are no right or wrong answers. Also it is appropriate in cases where there is a particular concern with understanding views from the participants' own subjective frames of reference. For the purpose of this report this research method was used because it described, translated, explained and in-

terpreted views from the perspectives of the people, offered a holistic view of the situation and reassured that the interpretation was verifiable and credible.

Critical Success Factors (CSFs)

The literature review, on academic papers published in peer reviewed journals, conducted on CSFs for ERP implementations has lead to the development of a critical success factor checklist. This checklist was produced in an attempt to summarize the critical success factors in the existing literature. All journals chosen had a spotlight on empirical or statistical data regarding CSFs that could add to the success of an ERP implementation project.

Goals and Objectives

Goals and objectives was one of the most critical success factors identified through literature review. The organization must carefully define the objectives regarding implementation and the critical business needs that the new system will address [3]. Clear goals and objectives, vision, business plan and the project strategy are very important to the success of the project. The clear definitions of goals, requirements, expectations and deliverables must be carefully explained from the beginning of the project in order to address any problems arising.

Top Management Support

Top management support is one of the most important and crucial factors in ERP system implementation projects [36] that has been the most often cited

“The implementation of an ERP system is a very complex and expensive project that places tremendous demands on an organization's time and resources”

“The critical success factors identified through the literature review are very well validated through this case study”

as both a success and failure factor [20]. Martin [43] suggest that for ERP implementation success top management should redesign its work to strategically concentrate on managing employee behavioral change in order to increase employee acceptance and reassure commitment by specializing its involvement on cultural and environmental contextual factors. This view is shared by Sumner [37] who states that top management's ability to undertake the cultural, political and structural change may be necessary for successful ERP system implementation and [33] who state that top management's commitment is needed in order to keep the users motivated to minimize the resistance to change. Holland and Light [15] however, argue that top management should monitor the implementation progress and provide a clear direction of the project in terms of their willingness to allocate valuable organizational resources

Business Process Reengineering

Hammer and Champy [14] define reengineering as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance. The organization should be ready to change procedures and practices in order to minimize the degree of customization needed. Minimal customization refers to severely limiting the amount of customization to the vendor's ERP product. Limiting customization ensures that vendor upgrades can be implemented with reduced organizational resource allocation and costs. According to [1] business process reengineering can be a big project in-

roducing several challenges to the organization and hence organizations are encouraged to assess the readiness for BPR before launching the effort because ERP implementation brings along work to refine processes and improve their quality which are often rejected by some part of employees [5].

Project Management

According to [19], good project management is vital to the implementation success and it is evidence that the implementation process needs to be managed as a project which needs an organization different from the one of the daily work [40]. Lanning [18] states that the most important elements of project management are to monitor the progress and exercise controls so that the project will meet its targets. In addition, [19] believe that in order to maintain credibility the scope of the ERP implementation project should be established, controlled and defined in terms of milestones, critical paths and deadlines from the early stages of the project and deadlines should also be met to help stay within the schedule and budget.

Project Team Commitment and Composition

Soja [34] has found that both project team composition and team involvement are among the most important elements for project success. Project team should consist of a good team composition. This includes an experienced project manager with skills in coordinating, scheduling and monitoring, the tasks that ensure the achievement of objectives and a competent team which has the ability to support the implementation by work-

ing exclusively on the project fully committed and without interruptions during the process of implementation [20]. In addition, Project management principles including an approved project plan, known specifications and level of complexity clearly defined and understood objectives are significant for the successful implementation of the ERP.

Communication

Communication according to several authors is one of the most difficult and challenging CSFs in ERP implementation. According to [4] communication is the second most critical area in implementation and especially important in the adoption phase. Lanning [18] underlines the communication as a critical factor and highlights the need for its effectiveness. Later [20] adds that communication is not a straight forward and easy task but [3] believe that it is essential for creating an understanding, an approval of the implementation and sharing information between the project team and communicating to the whole organization of the results and goals of the project. However, a view presented by [22] state that excessive and unnecessary communication also poses risk such as the possibility of cost overruns.

Customization

Customization was identified as critical success factors [15,37]. Customization means that the purchased ERP system needs to be configured in order to match the organization's processes by modifying its core source code which is the option used to reduce the gap between the ERP capabilities and the business prac-

“In our survey in-depth interviews with senior management, vendors, project managers, key users and end users were conducted”

““ The collection and analysis of requirements is also a CSF for which limited attention was paid in previous research ””

tices [30]. It is important for the organization however to consider an ERP that fits its organizational processes in order to minimize customization and implementation time.

Change Management

Organizational change is about people's reactions and attitudes to change with technology to be one of the major drivers that are stirring change faster in organizations [6]. Loonam [20] have listed change management as one of the top 10 CSFs in ERP implementation. One of the main obstacles facing ERP implementation is resistance to change [13] The implementation of such technology affects several units and functions that not only induces organizational change but also requires organizational change [40] that will force users to commitment in order to gain the expertise available for the reinforcement of the project. According to [41] in an ERP system implementation the focus is very much on people, and in particular users, as well as on processes and technologies but the primary focus is to achieve project goals as efficiently as possible [18].

User Support, Education and Training

The effect of user support, education and training is investigated by several authors who underline its importance [36,10,42,2]. Al-Mashari [2] state that it is challenge to create appropriate and effective plans for training and [31] argue that the importance of training is dependent on the characteristics of the system. Training with a

focus on the new business processes, technical aspects of the system and end user needs is a key part of successful ERP system implementation [29]. However, in ERP implementations, projects fail due to lack of proper training. The absence of an appropriate plan for training and education fails to increase the users' expertise and knowledge for all features of the new system leading to diminished users' valuable support during the implementation process.

Understanding User Requirements

Through the primary research carried out all the above factors were confirmed. In addition another factor was identified which has received limited attention in previous research. This new CSF relates to the importance of understanding the requirements and expectations of users and management before the selection of the ERP system. The research revealed that although there was a frame facilitating the evaluation of the systems no proper training of evaluators regarding user requirement design, system evaluation and implementation was conducted.

Consequently, implementers of ERP system are usually trying to cope with design and customization of the system in order to meet the idiosyncratic ways of working which involves considerable cost and time overruns and also adjusts the organizations processes and tactics in order to enable the ERP deployment. The reason behind these necessities is the poor analysis of the organization's requirements and business processes.

Conclusion

In response to the growing global competition many companies have embarked upon ERP implementation [9]. The scale of capital invested in these implementation projects however does not match the research that has been published on the subject. Most of the literature has concentrated on project management and technical implementation issues as well as failures and successes without giving much attention on preparedness and post implementation issues. The literature on performance measurement after implementation emphasized its poor use in SMEs [12] and even poorer with regards to the impact of an ERP system on organizational performance [25]. Nonetheless, research studies indicate that performance measurement systems can play a key role in supporting growth in SMEs [11].

This literature searched by ERP research taxonomy, along with the extensive review of ERP literature conducted by other authors found limited research topic that examined in depth each factor separately. However, it is clear that it is important for organizations to understand what it means to be mindful [39] in its approach to investing in an ERP package due to the complexity and costs involved.

In addition, limited research was conducted so far regarding the users characteristics. Age, gender, education level, management level and computer experience which may have an important impact on the ERP implementation process have received limited attention by researchers and further research is needed in order to investigate the impact possibilities.

The results of this research correspond to the expectations and answer the research questions. The critical success factors identified through the literature review are very well validated through this case study. In addition, collection and analysis of user require-

““ All critical success factors observed seem interrelated and interconnected to each other ””

ments are identified as a critical success factor that needs further research and analysis and a framework to be developed in order to empower the successful implementation. Also, recommendations for the empowerment of future ERP implementation is presented aiming to provide a broad view of a future situation and also to offer potential to a successful attempt. The development of a complement team that will empower the communication and facilitate the project, a careful selection of employees to participate in the implementation project, staff participation, training and education during the implementation will reassure the success of the project.

However, the analysis and findings show that all critical success factors observed seem interrelated and interconnected to each other. During the research it was revealed that each factor corresponds directly or indirectly to another highlighting the need for a holistic and integrated view of factors when research is conducted. This correlation could be an interesting topic for future research since no literature review was identified during the research.

In addition, according to [32] research effort is required to provide an ERP system that has the flexible assurance capabilities to evolve with the dynamic changes of a company. However, it is of significant importance the evolution of ERP systems to also assure the flexibility to accept best practices from organizations and through lessons learned to utilize them in order to increase the percentage of success stories at ERP.

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