GROUPING OF CRITICAL SUCCESS FACTORS FOR ERP IMPLEMENTATIONS

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ABSTRACT

Despite the benefits that can be achieved from a successful ERP system implementation, there is already evidence of high failure risks in ERP implementation projects. Too often, project managers focus mainly on the technical and financial aspects of the implementation project, while neglecting or putting less effort on the nontechnical issues. Therefore, one of the major research issues in ERP systems today is the study of ERP implementation success. Some authors have shown that ERP implementation success definition and measurement depends on the involved stakeholders. A typical approach used to define and measure ERP implementation success has been critical success factors approach.

In this paper we try to understand the Critical success factors of ERP implementations and how these factors can be put into practice to help the process of project management in ERP implementations. We attempt to build a consensus from previous research and to derive a integrated model of critical success factors in ERP implementations in four perspectives: organizational, technological, strategic and tactical.

1. INTRODUCTION

An Enterprise Resource Planning system (ERP) is an integrated software package composed by a set of standard functional modules (production, sales, human resources, finance, etc.) developed or integrated by the vendor, that can be adapted to the specific needs of each customer. The current generation of ERP systems also provides reference
models or process templates that claim to embody the current best business practices by supporting organizational business processes.

Even though the benefits that can be achieved from a successful ERP system implementation, there is already evidence of failure in projects related with ERP implementations (Davenport, 1998). Too often, project managers focus on the technical and financial aspects of a project and neglect to take into account the nontechnical issues. To solve this problem, some researchers are using the critical success factors (CSFs) approach to study ERP implementations.

The paper is organized as follows. First, we explain the research method used. Next, we define success and failure in ERP implementations. Then, we describe the CSFs model proposed. Finally, we give some conclusions and further work.

2. RESEARCH METHOD

The research method used is grounded theory proposed by Glaser and Strauss (1967). Our use of the grounded theory method was composed of the following phases:

- The first phase (research design phase) had two steps. The first step was the definition of the research subject and scope. Through the analysis of articles related with ERP systems, we detected a shortage of knowledge about the implementation of ERPs in organizations. Therefore, the goal of this study was to analyze, identify and define the CSFs of ERP implementations. The second step consisted in the collection and analysis of specialized literature.


- In phase three (data analysis phase) represents the operations where data are divided, conceptualized, and organized in new ways. We only made the open coding process. To increase validity and reliability of the resulting unified model, the several sources of information where triangulated and inconsistencies where clarified with additional documentation.

- The last phase (comparison phase) was a comparative analysis of the resulting model with other studies related with the subject.

Next, we describe the concept of ERP success and failure." and we present each of the concepts developed, their relationship with the data gathered, and the related categories.
3. SUCCESS AND FAILURE IN ERP IMPLEMENTATIONS

Nowadays, in the rising ERP research area, the definition and dimension of ERP implementation success is a thorny issue. Markus and Tanis (2000) state that success means different things depending on who defines it. Thus, for instance, project managers and implementation consultants, "often define success in terms of completing the project on time and within budget. But people whose job is to adopt ERP systems and use them to achieve business results tend to emphasize having a smooth transition to stable operations with the new system, achieving intended business improvements like inventory reductions, and gaining improved decision support capabilities" (Markus and Tanis 2000,P2). This relative point of view for success can also be applied to failure, and people will also qualify an implementation as a failure according to their goals.

According to Markus and Tanis (2000), optimal success refers "to the best outcomes the organization could possibly achieve with enterprise systems, given its business situation, measured against a portfolio of project, early operational, and longer term business results metrics." In this research we adopt Markus and Tanis point of view.

Pinto ,and Slevin (1987) defined a model of a project implementation success as $S : f (x_1,x_2,\ldots, x_n)$ where $S$ is project success and $x_i$- the critical success factor $i$. In this work we attempt to define a model of this nature for an ERP implementation project. Thus, our first task is to define each $i$.

4 TOWARDS A UNITED CSF MODEL

We collected all the CSFs found in the ERP literature and then, we determined the similarities or patterns of communality between them. The next step was to map them in a matrix (see Figure 1).

<table>
<thead>
<tr>
<th>Strategic</th>
<th>Tactical</th>
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<tbody>
<tr>
<td><strong>Organizational</strong></td>
<td><strong>Tactical</strong></td>
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<tr>
<td>• Sustained management support</td>
<td>• Dedicated staff and consultants</td>
</tr>
<tr>
<td>• Effective organizational change management</td>
<td>• Strong communication inwards and outwards</td>
</tr>
<tr>
<td>• Good project scope management</td>
<td>• Formalized project plan and schedule</td>
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<td>• Adequate project team composition</td>
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<td>• Comprehensive business process reengineering</td>
<td>• Reduced trouble shooting</td>
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<td>• Adequate project champion role</td>
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<tr>
<td>• User involvement and participation</td>
<td>• Empowered decision - makers</td>
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<td>• Trust between partners</td>
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In our view, the nature of the ERP implementation problems includes strategic, tactical, organizational, and technological perspectives. Therefore, we propose that the CSFs model should have these four perspectives. The organizational perspective is related with concerns like organizational structure and culture and, business processes. The technological perspective focuses on aspects related to the particular-ERP product in consideration and on other related technical aspects, such as hardware and base software needs. The strategic perspective is related with core competencies accomplishing the organization’s mission and long term goals, while the tactical perspective affects the business activities with short-term objectives.

### 4.1. ORGANISATIONAL PERSPECTIVE

#### Strategic Factors:

**Sustained Management support**

Management support is important for accomplishing project goals and objectives and aligning these with strategic business goals (Sumner 1999). Sustained management commitment, both at top and middle levels during the implementation, in terms of their own involvement and the willingness to allocate valuable organizational resources (Holland et al. 1999).

**Effective organizational change management**

Organizational change refers to the body of knowledge that is used to ensure that a complex change, like that associated with a new big information system, gets the right results, in the right timeframe, at the right costs. The change management approach will try to ensure the acceptance and readiness of the new system, allowing the organization to get the benefits of its use. A successful organizational change approach relies in a proper integration of people, process and technology.

**Good project scope management**

This factor is related with concerns of project goals, function and their congruence with the organizational mission and strategic goals. This includes both scope definition and
subsequent scope control. Some components of this factor are: scope of business processes and business units involved, ERP functionality implemented, technology to be replaced/upgraded/integrated, and exchange of data.

**Adequate project team composition**

ERP projects typically require some combination of business, information technology, vendor, and consulting support. The structure of the project team has a strong impact in the implementation process. Two important factors are the integration of third-party consultants within the team and the retention within the organization of the relevant ERP knowledge.

**Comprehensive business process reengineering**

This is related with the alignment between business processes and ERP business model and related best practices. This process will allow the improvement of the software functionality according to the organization needs. Managers have to decide if they do business process reengineering before, during or after ERP implementation.

**Adequate project champion role**

The main reason why this person is considered to be central to successful ERP implementations is that she or he has both the position and the skills that are critical for handle organizational change (Parr et al.1999). The role of the project champion is very important for marketing the project throughout the organization (Sumner,1999).

**User involvement and participation**

User participation refers to the behaviors and activities that users perform in the system implementation process. User involvement refers to a psychological state of the individual, and is defined as the importance and personal relevance of a system to a user (Harhvick and Barki 1994). User involvement and participation will result in a better fit of user requirements achieving better system quality, use and acceptance.

**Trust between partners**

During the implementation phase there are different partners, such as consultants and software and hardware vendors. An adequate partnership between them will ease achievement of the goals defined.
Tactical Factors:

**Dedicated staff and consultants**

Usually, in many cases the time dedicated to the implementation project is shared with other activities. It is also important to ensure that the staff believes in the project success. Consultants should be involved in a way that helps the implementation process while also sharing their expertise with the internal staff involved. This is related with the recruitment and motivation of staff and consultants.

**Strong communication inwards and outwards**

Communication should be of two kinds “inwards” the project team and outwards' to the whole organization. This means not only sharing information between the project team but also communicating to the whole organization the results and the goals in each implementation stage. The communication effort should be done in a regular basis during the implementation phase.

**Formalized project plan/schedule**

This means to have a well-defined plan/schedule for all the activities involved in the ERP implementation, with an appropriate allocation of budget and resources for these activities. Evidence shows that the majority of projects fail to finish the activities on time and within budget. To ensure the project completion according with the plan/schedule, close monitoring and controlling of time and costs should be done, as well as implementation project scope and plan/schedule review, whenever justified.

**Adequate training program**

The training plan should take into consideration both technical staff and end-users, and its scope will depend on the type of implementation approach selected. Some organizations use an in-house training approach while others prefer using training consultants.

**Reduced trouble shooting**

This factor is related with the problem and risk areas that exist in every implementation. Trouble-shooting mechanisms should be included in the implementation plan. Two important aspects are the adaptation and transfer of old data and the ‘go live' moment. The time and effort involved in the transfer of data from previous systems should not be underestimated.


**Appropriate usage of consultants**

Determining the number, how and when to use external consultants appropriate to the ERP implementation needs. The usage of external consultants will depend on the internal know-how that the organization has at the moment.

**Empowered decision-makers**

Project team members must be empowered to make quick decisions to reduce delays in implementation related with slow decision-making (Parr et. al, 1999). Organizations should attempt to make decisions as rapidly as possible, as even small delays can have an impact on such a long-term project (De Bruin, 1997).

**4.2 TECHNOLOGICAL PERSPECTIVE**

**Strategic Factors:**

**Adequate ERP implementation strategic**

This includes management decisions concerning how the software package is to be implemented (Holland et al, 1999). There are different approaches to ERP implementation strategy ranging from 'skeleton' to 'big-bang' implementations (Gibson et al, 1997). While 'skeleton' implementations are phased and provide usable functionality incrementally, 'big-bang' ones offer full functionality all at once at implementation end. The advantages and disadvantages of these extreme approaches should be measured, especially at a functionality level.

**Avoid customization**

Wherever and as far as possible, the ERP-hosting organization should try to adopt the processes and options built into the ERP, rather than seek to modify, the ERP to fit the particular business practices (Parr et al, 1999). Thus, it is recommended that customization adheres to the standardized specifications that the software supports (Sumner 1999). In this sense, a good business vision is helpful because it reduces the effort of capturing the functionality of the ERP business model and therefore minimizes the customization effort.

**Adequate ERP version**

An organization needs to determine which ERP version it will implement. Frequent upgrades can cause problems. This is particularly relevant when the organization has to wait for a future release that includes the functionality required (De Bruin, 1997).
Tactical Factors:

Adequate software configuration

Software configuration involves adapting the generic functionality of a package to the needs of a particular organization (Markus and Tanis, 2000). Also, there is the need to configure the interfaces according to the user's needs. Nowadays, there are some modeling tools that can help in all these tasks. Before going live, validation tests should be applied.

Legacy systems

Legacy systems are the business and IT systems prior to the ERP that encapsulated the existing business processes, organization structure, culture and information technology (Holland et al, 1999). They are a good source of information for ERP implementations and the possible problems that can be found during the implementation.

Another aspect is to decide which legacy systems will be replaced and the need to interface with those legacy systems for which the ERP does not provide an adequate replacement.

5 CONCLUSIONS AND FUTURE WORK

This study defines a unified CSFs model for ERP implementations. This model was developed through the application of grounded theory and based in a set of previous CSFs lists. The number of CSF is large but they are divided in four perspectives: strategic and tactical perspectives, and organizational and technological perspectives.

An important aspect is that most of the factors found can be considered "classics" since they are not specific to ERP implementations. The analysis of the CSFs literature shows that management support is the most important factor in an ERP implementation followed by organizational change management. These CSFs have almost nothing to do with technology and almost everything to do with people and process, due to the effort that has to be undertaken by the whole organization in a project of this nature.

In the development of case studies we pretend to take into account some recent studies that categorized the different types of ERP implementations (Pan and Shank, 2000). The model developed here constitutes the basis for further research, whose goals will be to validate the model, to represent the CSFs proposed using a formal modeling language, and to develop for each CSF a set of key performance indicators that will help in using the model.
REFERENCES