Reassessing critical success factors for ERP adoption – a case study

Olaf Boon
School of IS
Deakin University, Australia
oboon@deakin.edu.au

Brian Corbitt
School of IS
Deakin University, Australia
bcorbitt@deakin.edu.au

Konrad Peszynski
School of IS
Deakin University, Australia
konradp@deakin.edu.au

Abstract

This paper reports a reevaluation of existing research on critical success factors in the adoption of ERP systems in organizations. The paper reports an in-depth case study of an ERP adoption and implementation process reporting specifically on the CSFs which had an impact. These factors are compared to those identified in the existing literature and show that whilst the key factors like the role of project champions are confirmed, there was less evidence of a range of factors influencing decisions involved with the adoption of the ERP.

Keywords: ERP, critical success factors, top management, IS adoption

1. Introduction

Enterprise resource planning (ERP) has gained prominence in information systems research since the late 1980’s (Holland and Light, 1999a, 2001a; Light et al., 2001; Somers and Nelson, 2001). ERP systems are a complex multi-dimensional multi-tasking information system which is driving large and medium sized business adoption of integrated IT (Gibson et al., 1999). The aim of this paper is to reassess the critical success factors in ERP adoption.

A core strategy for ERP is linking internal and external organizational information systems, including the sum of enterprise wide applications and supply chain management (Gibson et al., 1999). Many, if not all, aspects of an organization’s information needs is supported by ERP (Davenport, 2000; Sammon and Adam, 2002). Organizations need to understand their own business processes (Sammon and Adam, 2002) before implementing an ERP system. ERP systems are internally focused but there is a need for organizations to look at using an ERP system to explore integration opportunities with customers, and suppliers, processes and systems (Norris et al., 2000). As a result, it is important to reassess the critical success factors noted by Holland and Light (1999a, 2001a) to determine if a cycle of practice and redundancy over the past five years is reflected in success and/or failure in ERP systems adoption.

2. Critical Success Factors in ERP adoption

According to Rockart (1979, p5) critical success factors “are a shorthand statement of those limited number of areas where “things must go right” for the IS function to be successful and for the IS executive’s goals to be attained” in addition to being “the means to the objectives – which are the desired ends” (p7). Boynton and Zmud (1984) see CSFs being “elicited from managers who represent a cross section of the organizations major functional areas” (p17). CSF method is designed to help managers, and systems designers, identify a few key areas that will lead to achievement of management objectives (Rockart, 1979, 1982; Martin, 1982). Holland and Light (1999a, 1999b, 2001a) and Light et al. (2001) have demonstrated that the key critical success
Factors in ERP implementation are based on five theoretical constructs: functional importance, evolution of structure, usage and human acceptance, vision, and benchmarking.

### Table 1: Critical Success Factors in Adoption and/or Implementation of Information Systems in the Literature

<table>
<thead>
<tr>
<th>Critical success factor</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top management support</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Poon and Wagner (2001); Croteau and Li (2003); Havelka and Lee (2002); Sila and Ebrahimpour (2003); Wali et al. (2003); Wilson et al. (2002); Martin (1982); Yusof and Aspinwall (2000); Zhang et al. (2003); Averweg and Erwin (1999); Hartman and Ashrafi (2002); Teo and Ang (1999)</td>
</tr>
<tr>
<td><strong>Clear goals and objectives</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Poon and Wagner (2001); Havelka and Lee (2002); Wilson et al. (2002); Bender et al. (2000); Martin (1982); Udo and Kick (1997); Averweg and Erwin (1999); Khandelwal and Ferguson (1999); Hartman and Ashrafi (2002); Allen et al. (2002)</td>
</tr>
<tr>
<td><strong>Business process reengineering (BPR)</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Poon and Wagner (2001); Sila and Ebrahimpour (2003); Wali et al. (2003); Bender et al., (2000); Yusof and Aspinwall (2000); Zhang et al. (2003); Averweg and Erwin (1999); Khandelwal and Ferguson (1999); Sneed and Brossler (2003); Allen et al. (2002)</td>
</tr>
<tr>
<td><strong>Project management</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Poon and Wagner (2001); Havelka and Lee (2002); Sila and Ebrahimpour (2003); Wilson et al. (2002); Bender et al. (2000); Martin (1982); Zhang et al. (2003); Khandelwal and Ferguson (1999); Hartman and Ashrafi (2002); Teo and Ang (1999)</td>
</tr>
<tr>
<td><strong>Information technology</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Poon and Wagner (2001); Croteau and Li (2003); Wilson et al. (2002); Bender et al. (2000); Yusof and Aspinwall (2000); Zhang et al. (2003); Khandelwal and Ferguson (1999); Allen et al. (2002); Hartman and Ashrafi (2002); Teo and Ang (1999)</td>
</tr>
<tr>
<td><strong>Data, information and knowledge management</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Poon and Wagner (2001); Croteau and Li (2003); Sila and Ebrahimpour (2003); Wali et al. (2003); Bender et al. (2000); Martin (1982); Zhang et al. (2003); Averweg and Erwin (1999); Khandelwal and Ferguson (1999)</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Sila and Ebrahimpour (2003); Wali et al. (2003); Bender et al. (2000); Yusof and Aspinwall (2000); Averweg and Erwin (1999); Khandelwal and Ferguson (1999); Sneed and Brossler (2003); Hartman and Ashrafi (2002)</td>
</tr>
<tr>
<td><strong>Users</strong></td>
<td>Havelka and Lee (2002); Sila and Ebrahimpour (2003); Wali et al. (2003); Wilson et al. (2002); Udo and Kick (1997); Zhang et al. (2003); Averweg and Erwin (1999); Khandelwal and Ferguson (1999); Sneed and Brossler (2003); Teo and Ang (1999)</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Sila and Ebrahimpour (2003); Bender et al. (2000); Yusof and Aspinwall (2000); Udo and Kick (1997); Khandelwal and Ferguson (1999); Teo and Ang (1999)</td>
</tr>
<tr>
<td><strong>Project team competence</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Havelka and Lee (2002); Sila and Ebrahimpour (2003); Wali et al. (2003); Bender et al. (2000); Udo and Kick (1997); Khandelwal and Ferguson (1999); Teo and Ang (1999)</td>
</tr>
<tr>
<td><strong>Interdepartmental cooperation</strong></td>
<td>Somers and Nelson (2001); Akkermans and van Helden (2002); Havelka and Lee (2002); Wali et al. (2003); Bender et al. (2000); Udo and Kick (1997); Teo and Ang (1999)</td>
</tr>
</tbody>
</table>

Table 1 shows critical success factors related to IS adoption and implementation that are identified in specific literature review of 21 papers on CSF research. The 21 papers were selected because they expressly research CSFs for IT and IS implementation in a framework similar to that established by Rockart (1979, 1982). From these 21 research papers CSFs have been identified as being any number of factors. These can be events, circumstance, conditions or
activities, internal or external, requiring special attention for they have significance to the corporation with positive or negative influences (Dickinson et al., 1984; Croteau and Li, 2003). CSFs can also be the elements of trust and effective communication (Hartman and Ashrafi, 2002), human factors, such as having top management support, a project champion driving the project, as well competent project teams (Havelka and Lee, 2002; Somers and Nelson, 2001; Boynton and Zmud, 1984; Akkermans and Heldren, 2002; Bergeron and Begin, 1989; Hartman and Ashrafi, 2002; Croteau and Li, 2003), also include having the appropriate IS staff, with skills for the project and an empathy for supporting users (Teo and Ang, 1999; Pollalis et al., 1993; Khandelwal and Ferguson, 1999). The level of user involvement, training, commitment and overall acceptance in the IS project can be CSFs (Havelka and Lee, 2002; Somers and Nelson, 2001; Akkermans and van Heldren, 2002).

Since Rockart’s (1979) inaugural work on CSFs many researchers have explained and tested CSFs for IS implementation with case studies, action research, and further literature reviews, finding a combination of holistic categories of CSFs, or simplistic and extensive lists of CSFs. CSFs have bee found for: HEI (Allen et al., 2002), information systems executives (Martin, 1982; Poon and Wagner, 2001); total quality management (TQM) (Sila and Ebrahimpour, 2003; Wali et al., 2003); IS downsizing (Udo and Kick, 1997); requirements gathering (Havelka and Lee, 2002); software maintenance (Sneed and Brossier, 2003); decision support systems (DSS) (Averweg and Erwin, 1999), and client relationship management (CRM) (Croteau and Li, 2003), as well as difference amongst geographic regions has also been found (Khandelwal and Ferguson, 1999; Averweg and Erwin, 1999; Zhang et al., 2003).

The key CSF in the literature is top management support. Top management sets the social agenda for the organisation and is influenced by strategic objectives, responsibility to stakeholders, power, politics, and external influences (Corbitt et al., 2004). In addition top management and project champions require the skills, experience, knowledge or wisdom to make judgments that lead them to lending their support to an IS project. Without the factor of top management or project champion achieving IS implementation success is diminished (Martinsons, 1993; Somers and Nelson, 2001).

This paper uses a case study of an ERP adoption to test the propositions suggested by the existing literature related to those factors which are most important for ERP systems. However to gain a more detailed insight into the extent of importance of each of the factors we have used a singular case study to explore the extent of importance and the qualifications associated with each success factor. This will be used to extrapolate existing understanding and represent the real complexity in ERP adoption that lists of CSFs do not.

3. Methodology

An ethnographic approach to data collection was adopted for this study, as it allowed the researchers to better understand the relationship between the actors and the development and implementation of the ERP system over an extensive period of time (Leedy, 1994). As the important role of top management throughout the ERP implementation process will be investigated, there is a need to observe the environment in which all actors operate. In this research we used the framework by Leedy (1997) and Cavana et al. (2001), where the researcher becomes a member of the organisation, contributing and partaking in the organizational activities.
To understand historical context and appraise the process already in place, the researchers supplemented the observation process with 15 interviews of senior staff that played key roles in the implementation process. This study requires the researchers to become heavily involved with and interacting with the ERP implementation process (Leedy, 1994).

4. Case Study
The University of Australia began implementing an ERP system in 1997. This ERP system was purposely designed to be built over a two to three year period and built on the expertise that already existed within the University. The creation and implementation of the ERP at the University of Australia was successful. All indicators in terms of performance, delivery of modules on time, integration and performance within the University administration and the provision of administrative services to the University have all been more than satisfactory. Reviews from University Council documents and other internal documents within the University, demonstrate that all critical success factors were met within the desired limits set at the start of the project.

The ERP system at the University of Australia began with an identified need for integration of services. The University had, for a long time been using IT for the provision of various services including Finance, Human Resources, Curriculum Development and Student Services. However, there had been no attempt to integrate the service or to work off a substantial student base. Decisions were made about the ERP system starting in 1997, and it was to be built on a single database of information about Human Resources in the University connected to other databases related to financial resources and other administrative functions. The University of Australia was not simple created, it became about through amalgamation of six institutions up to 300 kilometers apart. This posed significant challenges in distance and the distinct cultures of each of the original institutions. The role of top management, in this case the Vice-Chancellor, became a critical success factor in the determination of this ERP system, ensuring that the decisions made about the ERP system was one that was supported from the top of the University. Not only in terms of rhetoric but also in terms of resources made available to ensure that the project was successful. Further details of the case study are reported elsewhere (Corbitt et al., 2004). The focus in this paper is to report those critical elements reported in the study which relate to factors enabling success. These are summarized in Table 2.

<table>
<thead>
<tr>
<th>Critical success factor in the literature</th>
<th>Critical success factors in ERP implementation – University of Australian</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support (Project champion)</td>
<td>Key factor. The project champion had a substantial power base through his position and utilized this base to facilitate implementation and fight the substantial battle with the previous owners of the administrative processes.</td>
<td>The case study demonstrates what the literature articulates: the support of top management and role of a project champion is the key success factors for IS/ERP implementation.</td>
</tr>
<tr>
<td>Clear goals and objectives</td>
<td>There were clear goals and objectives but their importance were not key to the adoption process.</td>
<td>The literature suggests that from the onset this factor should be documented and distributed.</td>
</tr>
<tr>
<td>Business process reengineering</td>
<td>This was a not a consideration.</td>
<td>The literature focus is on business organizations where ROI and risk management</td>
</tr>
</tbody>
</table>

Table 2: Comparison of critical success factors from an ERP case study and literature.
Project management

Project champion held tight control of the project within his domain of responsibility and directed each head of a specific area to undertake various projects combining into the ERP. The literature focus is on the use of management tools, techniques and methodologies. The case study demonstrates that the project champion sets the agenda and guides the implementation.

Information technology

This was the source of the rationale for the ERP development based on Oracle rather than buying an already developed package. An internally developed Student Administrative System was considered as strategically important for the ERP infrastructure.

The case study is consistent with the literature, where IT can be made up of many variables: choice of IT architecture; selection of hardware and software; and/or the use of Web technologies. Also included is the technology capabilities and future scalability.

Data, information and knowledge management

The ERP had to be underpinned with Oracle’s databases and driven through non-Microsoft systems.

Case study supports the literature for the need to have integration, accuracy, and reliability of data and information, across the organization.

Outcomes

The university saw this development as an opportunity to significantly impact on the efficiencies within the university by centralizing administrative functions and reducing the influence and control of faculties.

The consistency with the literature relates to the drive to achieve generalized system operating efficiencies.

Users

Users need some coherence across the university and a real sense of standards and standardized processes.

The case study is supported by the literature.

Resources

All resources were made available, but were prudently managed.

The case study is consistent with the literature.

Project team competence

The importance of this element is demonstrated by the recruitment of staff to fill key roles.

The case study is consistent with the literature which discusses the need to have competent people filling key roles.

Interdepartmental cooperation

This issue was more of a blockage, as the diverse and distributed units were having their control challenged.

The case study dramatizes the need to consider this factor, and is consistent with the literature.

5. Discussion

This case study does not reflect the diversity of CSFs identified in the literature. Reassessment of critical success factors reflects the success of the CSF method leading to a diversity of CSF research and the need to identify difference in CSFs for different types of information systems. This is a departure from Rockart (1972, 1982) and Holland et al’s (1999a, 2001a) early focus on the CSF method. Perhaps this reflects the impact of different organizational contexts and business drivers. Where as an in depth study makes no predictions about factors but lets them emerge, reflects a more realistic appraisal of the strength and importance of factors.

One critical success factor – top management support, stands out as primary factor for IS implementation success, this clearly supports findings in the literature (Somers and Nelson, 2001; Akkermans and van Helden, 2002). This paper demonstrates the validity of the CSF method introduced by Rockart (1979) and Holland et al. (1999a, 2001a) for ERP. In reassessing the critical success factors for IS implementation, this paper has identified findings that require further research.

6. References


Cavana, R. Y., Delahaye, B. L., & Sekaran, U. Applied Business Research: Qualitative and Quantitative Methods, John Wiley & Sons, Australia, Ltd, 2001


Holland, C. P. and Light, B. "Global enterprise resource planning implementation," Proceedings of the 32nd Hawaii International Conference on System Sciences, Hawaii, USA, 1999b


Khandelwal, D. V. K. and Ferguson, J. R. "Critical Success Factors (CSFs) and the Growth of IT in Selected Geographic Regions," Proceedings of the 32nd Hawaii International Conference on System Sciences, Hawaii, USA, 1999


Martinsons, M. G. "Cultivating the Champions for Strategic Information Systems," Journal of Systems Management (44:8), 1993, pp. 31-34


Rockart, J. F. "Chief executives define their own data needs," Harvard Business Review (57:2), 1979, pp. 81-93


Wali, A. A., Deshmukh, S. G. and Gupta, A. D. "Critical success factors of TQM: a select study of Indian organisations," Production Planning and Control (14:1), 2003, pp.3-14


