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CSF Relationships in ERP Project Implementations: A Collective Case Study

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ABSTRACT
The objective of this paper is to present a conceptual model of CSF (Critical Success Factor) relationships for ERP (Enterprise Resource Planning) project implementations. This model progresses the traditional theoretical concepts underpinning CSFs, from simple classifications and CSF lists, to providing an insight into the interconnectedness existing between CSFs for ERP project implementations. While the model is developed using a collective case study research approach, it can be validated and tested by further research. In its current form the model emerges from a within-case and cross-case analysis of the presence/absence of certain CSFs, concentrating on the complex relationships identified between these CSFs, within the four interpretivist cases studied. Indeed, following the analysis of the cases studied, it can be argued that the Conceptual Model of CSF Relationships presented in this paper moves to raise the level of managerial awareness (in particular) of the importance of the interconnectedness of CSFs for ERP project implementations.

Keywords
ERP, CSFs Interconnectedness, Case Study, Conceptual Model.

INTRODUCTION
ERP packages are a means for organizational transformation and IT innovation since the mid 1990s and form the cornerstone of IS for an ever increasing percentage of organizations (Holland and Light, 2001; Swanson and Ramiller, 2004; Sharif et al., 2005; El Amrani et al., 2006). Investing in an ERP package has been characterized as a Transformation investment (Ross and Beath, 2002), which requires managers to understand the importance of changes to the business in order to achieve the expected benefits from the project (Murphy and Simon, 2002; Ross and Beath, 2002). While investments in ERP packages are amongst the most significant organizational investments, the realities of ERP implementation are not fully understood by managers (Olsen and Saetre, 2007) and the benefits expected at the outset of the project are not always a realistic feature (Chen, 2001; James and Wolf, 2000; Murphy and Simon, 2002; Shang and Seddon, 2002; Law and Ngai, 2007). All too often organizations fail to prepare appropriately for an ERP project implementation, which has been referred to as mindlessness by Swanson and Ramiller (2004), and as a result invest in what is essentially an IT initiative as opposed to a business change project (Wood and Caldas, 2001; Murphy and Simon, 2002; Ross and Beath, 2002). Furthermore, existing research on CSFs for ERP project implementations is limited and presents both the academic and practitioner communities with a ‘sense of confusion’ regarding the best way to approach the implementation of an ERP package and the factors to address that can be detrimental to the outcome of a project, if unmanaged. We argue that a lack of managerial focus on the interconnectedness of the CSFs for ERP project implementations is the root cause of organizations not achieving their desired outcomes from their ERP-based Transformation investments. To meet this objective we conduct a collective case study to establish the true nature of CSF relationships (interconnectedness) through highlighting the impact of these CSFs on achieving desired ERP project outcomes within each of the four cases studied.

The remainder of this paper is structured as follows. The CSFs for ERP project implementations are discussed in the next section and the limitations of such research is highlighted. This is followed by a presentation of the research approach and the four research cases studied. Finally, the interconnectedness of CSFs for ERP project implementations is discussed across the four cases of ERP implementation studied. A series of CSFs for ERP project implementations are analyzed across the cases to provide an insight into the presence or absence of these CSFs at the outset of the project and the impact on project outcomes. In conclusion a conceptual model of CSF relationships is presented, embracing the outputs of the with-in case and cross-case analysis. The paper closes with an overview of the research objective and illustrates the contribution of this study.
CSFS FOR ERP PROJECT IMPLEMENTATIONS

CSFs have been applied to many aspects of Information Systems (Butler and Fitzgerald, 1999) and are defined as “those few critical areas where things must go right for the business to flourish” (Rrockart, 1979; p.85). An abundance of research articles have been published over the past fifteen years documenting various CSFs for ERP project implementations (c.f. Holland et al., 1999; Holland and Light, 1999; Bingi et al., 1999; Sumner 2000; Parr et al., 1999; Parr and Shanks, 2000; Chen, 2001; Esteves and Pastor, 2001; Nah et al., 2001; Somers and Nelson, 2001; Akkermans and van Helden, 2002; Hong and Kim, 2002; Al-Mashari et al., 2003; Brown and Vessey, 2003; Umble et al., 2003; Verville and Bernardas, 2005; King and Burgess, 2006; Finney and Corbett, 2007). Table 1 provides a thorough synthesized representation of the CSFs for ERP project implementations. The CSF names used in Table 1 were chosen from the terminology frequently used in the literature to allow the reader to appreciate and easily identify the concepts these CSFs represent. Therefore, Table 1 presents a macro-level naming of each of the eight CSFs we have synthesized from the literature reviewed, to embrace as exhaustive a set of CSFs as possible (without carrying the large number of different factor names presented; for instance in Finney and Corbett, 2007), while also reporting on when each factor is considered a success/failure as gleaned from the extant literature reviewed.

<table>
<thead>
<tr>
<th>CSFs</th>
<th>Factor is considered a Success when..</th>
<th>Factor is considered a Failure when..</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF1: Existence of Actual Strategic Business Need informing Specific Project Goals and Objectives</td>
<td>The project mission is related to business needs and this is clearly stated</td>
<td>Organizations fail to specify their organisational objectives</td>
</tr>
<tr>
<td>CSF2: Top Management Commitment and Support</td>
<td>Top management monitors the progress of the project and provides the direction for the implementation</td>
<td>High-level executives do not have a strong commitment to the project</td>
</tr>
<tr>
<td>CSF3: Prioritised Business Requirements and Required System Functionality</td>
<td>Organizations translate business needs into prioritised activities and recognise the importance of streamlining business operations</td>
<td>Organizational diversity is ignored or downplayed and idiosyncratic ways of doing business, which are most likely inefficient, are automated</td>
</tr>
<tr>
<td>CSF4: Allocation of Best Internal Business Personnel</td>
<td>The internal business resources are dedicated full time to the project and understand the overall needs of the organization and guide the project efforts in the right direction</td>
<td>The most knowledgeable organizational personnel are not part of a cross-functional project team and there is an overreliance on consultants, often resulting in limited knowledge transfer</td>
</tr>
<tr>
<td>CSF5: Effective Communication</td>
<td>Top management communicate a shared vision of the organization including the role of the new system and structures</td>
<td>Internal communication channels are not open at all times and / or neglect certain categories of actors</td>
</tr>
<tr>
<td>CSF6: Definitive Project Scope</td>
<td>The project scope is clearly defined, understood and controlled, including the number of modules implemented, the involvement of business units, and the amount of business process reengineering needed</td>
<td>A lack of coordination leads to implementation delays and organizational conflicts, while piecemeal implementation neglects the very purpose of an integrated package</td>
</tr>
<tr>
<td>CSF7: Accurate Project Timeframe and Costing</td>
<td>Comprehensive project planning is not taken lightly or with little forethought</td>
<td>Organizations were unable to develop a comprehensive plan</td>
</tr>
<tr>
<td>CSF8: Required Organisational Buy-In and Project Ownership</td>
<td>Cross-functional coordination exists ensuring appropriate involvement of all stakeholders</td>
<td>If no agreement or collaboration on changes exists between managers then there will be no ‘enthusiasm’, ‘buy-in’ or there may even be active resistance</td>
</tr>
</tbody>
</table>

Table 1. A Synthesis of CSFs for ERP project Implementations (adapted from the literature listed above)

It can be argued that the volume of literature relating to the factors critical to an ERP project implementation falls short of providing organizational decision-makers with the necessary issues to address in an ERP project, and more importantly the methods through which these issues can be understood at the outset of the project. Indeed, the available literature on CSFs for ERP project implementations is limited in terms of providing an insight into the interconnectedness of CSFs. However, it can be argued that back in 1999 the question being asked was ‘what are the CSFs for an ERP project implementation?’
However, at the present time, in light of the high percentage of ERP project implementation failures, the question that needs to be asked is more concerned with establishing the interconnectedness of CSFs and ‘what are the relationships between CSFs that should be understood at the outset of the project’?

While studies of CSFs for ERP project implementations are well received in the academic community and provide lists of CSFs, they are “only a partial aid to the practitioner struggling to understand the implications of their actions”, while “the vast majority of the literature [on CSFs for ERP project implementations] focuses on ‘static’ CSFs, often for the development stage of the lifecycle, and generally not explicitly linked to outcomes” (King and Burgess, 2006 p.59; p.67). Therefore, the true nature of CSF relationships and the impact of this CSF interconnectedness on achieving desired ERP project outcomes need to be established. In fact, Lam (2005, p.176) commented that CSF studies are “valuable for making sense out of problems where there are many potential factors influencing the outcome, and where the researcher hopes to make a set of practical recommendations based on the most influential factors”.

It has been argued that a more intimate understanding of CSFs [and the interconnectedness of these factors] by managerial decision-makers would ensure that these factors receive attention to guide an ERP implementation (c.f. Finney and Corbett, 2007). However, despite several calls being made by researchers throughout the last decade to address this situation, reporting that researching the ‘degree of criticality’ (Nah et al., 2001), and ‘multiplicative effects’ (Holland and Light, 1999; Holland et al., 1999) was a critical next step for research, a very limited research output of this nature can be identified. In fact, as few as two academic publications (Akkermans and van Helden, 2002; King and Burgess, 2006) were seen to move the CSFs for ERP project implementations debate on from simply listing factors to examining the causal relationships between the abundant lists of CSFs. Therefore, IS researchers need to contribute towards raising the usefulness and relevance of the CSF approach, in particular with regard to guiding ERP project implementations so organizations can improve their chances of achieving their desired project outcomes.

**THE RESEARCH APPROACH**

In light of the lack of theoretical maturity around the CSFs for ERP project implementations and the level of organizational dissatisfaction with ERP project outcomes, this exploratory research sought to build theory using case studies. From the perspective of this research study, the following description of the appropriateness of a case study to a particular type of research seems accurate: “case research is particularly appropriate for certain types of problems: those in which research and theory are at their early, formative stages, and sticky, practice-based problems where the experiences of the actors are important and the context of action is critical” (Benbasat et al., 1987; p.369). The selection of cases, the sampling problem, is an important aspect when building theory from case studies. A ‘collective case study’ (Stake, 2000; p.437) research strategy was adopted for this study. A collective case study is a qualitative research approach which is extended to several cases using a replication strategy. In an effort to guide the case selection, the insights of Stake (2000) were drawn upon, where an instrumental study replicated in several cases was undertaken. It is a fact that understanding a single intrinsic case would not in itself have fulfilled the objective of this study, however, jointly studying a number of instrumental cases better facilitated investigating the presence or absence of CSFs for ERP project implementations, where the diverse organizational stories of those ‘living the case’ could be teased out (Stake, 2000). In the context of this study, for an organization to be considered suitable for inclusion it had to have undertaken an ERP project, and at the time of first contact with the organization, be in the post-implementation phase, operating on an ERP platform for at least twelve months, for all or part of the project, depending on the implementation approach followed by the organization. We used a systematic purposeful sampling approach (Patton, 1990) for the selection of the research sites, where we considered twelve potential organizations, which were reduced to four case studies at the end of a process of elimination. To maintain good quality research design, the selection of the four cases was driven by the ‘appropriateness’ (Miles and Huberman, 1994; Patton, 1990) of each research site, in that they demonstrated a fit to both the purpose of the research and the phenomenon of inquiry. The four organizations we studied are as follows: SerCom Solutions, an Irish owned organization specializing in Supply Chain Management Services, Banta Global Turnkey (BGT) a global organization involved in a similar business to SerCom, the Irish Health Services (now the Health Service Executive), and An Post, the state-owned entity in charge of delivering postal services in Ireland. In retrospect, this collection of cases has proven extremely beneficial, due to the fact that understanding them has led to (1) a better overall understanding of the desired project outcomes and, (2) an in-depth understanding of their

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1 We define our understanding of project outcomes as part of the Conceptual Model of CSF Relationships presented later in this paper.

2 R.R. Donnelley, the world’s premier full-service provider of print and related services, including document-based business process outsourcing, acquired Banta Corporation for $1.3 billion on January 9th 2007.
respectively aware and preparedness to undertake such an initiative regarding the presence or absence of certain CSFs for ERP project implementations. Table 2 illustrates the key differences between the cases, as well as their inherent cohesion as a sample of four organizations having undertaken and completed ERP projects in the last few years.

<table>
<thead>
<tr>
<th></th>
<th>SerCom</th>
<th>BGT</th>
<th>HSE</th>
<th>An Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector</td>
<td>Private</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
</tr>
<tr>
<td>ERP Package</td>
<td>SAP R/3</td>
<td>JDE World</td>
<td>SAP R/3</td>
<td>JDE OneWorld</td>
</tr>
<tr>
<td>ERP Footprint</td>
<td>Core Operations (Manufacturing and Logistics)</td>
<td>Core Operations (Supply Chain Manufacturing and Finance)</td>
<td>HR / Payroll</td>
<td>Finance</td>
</tr>
<tr>
<td>ERP System Type</td>
<td>Value Chain Operations</td>
<td>Value Chain Operations</td>
<td>Support Operations</td>
<td>Support Operations</td>
</tr>
<tr>
<td>Project Type</td>
<td>Business Change</td>
<td>IT</td>
<td>IT</td>
<td>Business Change</td>
</tr>
<tr>
<td>Enterprise-Wide View</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Project Outcome</td>
<td>Very Successful</td>
<td>Near Failure</td>
<td>Suspended</td>
<td>Partly Successful</td>
</tr>
<tr>
<td>Point-of-Contact Comment</td>
<td>“The project required an enormous effort from everyone but it was successful”</td>
<td>“I could tell you all the things not to do. We have not done well with our implementation”</td>
<td>“This project is not going well. It will face huge issues when rolled-out nationally”</td>
<td>“We have learned some hard lessons but that’s the nature of these projects”</td>
</tr>
</tbody>
</table>

Table 2. Initial Perceptions of Cases Selected for the Research Study

Data Collection and Data Analysis

Project documentation and interviews were the primary sources of empirical data. Documentation analysis was exploited as much as was possible, and for each case the documentation provided specific details to corroborate, and in some instances clarify, evidence collected through interviews. A total of 84 hours of interviews was conducted over a two year period for this study (Table 3).

<table>
<thead>
<tr>
<th>Organization</th>
<th>Number of Informants</th>
<th>Hours of Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>SerCom</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>BGT</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>HSE</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>An Post</td>
<td>6</td>
<td>17</td>
</tr>
</tbody>
</table>

Table 3. Breakdown of Interviews by Case

All interviews, one to three hours in duration, were conducted on site. Almost all interviewees were interviewed two, and in some cases, three times. All interviews were audio-taped and transcribed. Following the first round of interviews, transcripts were sent to the informants for review and verification of the content. During the focused interviews ambiguities and discrepancies were clarified. Furthermore, the repeat rounds of focused interviews ensured that a certain flow of questioning was followed based on the analysis conducted on the earlier interviews.

In the within-case analysis, rich constructed narratives were developed to characterise each ERP project implementation. These were used in the cross-case analysis to compare cases systematically, illustrating the similarities and differences between the cases. The informants’ retrospective accounts were used to rigorously detect the presence or absence of CSFs for ERP project implementations in their respective projects and were used to provide a means of investigating the interconnectedness between the CSFs based on the informants’ learning experiences in relation to undertaking an ERP project implementation. The retrospective accounts were triangulated with available documentation to ensure that the ‘plot’ of each case was reported “correctly”. As part of the data reduction process and in an effort to build a logical chain of evidence for each case, a series of ‘explanatory effects matrices’ (Miles and Huberman, 1994) were used during both the
within-case and cross-case analysis. Table 4 illustrates some of the final outputs of the iterative analysis process. The explanatory effects matrices were further analyzed and aided the development of the conceptual model of CSF relationships.

A COMPARATIVE ANALYSIS OF THE CASES STUDIED

Based on the within-case and cross-case analysis we conducted (reported in detail in other publications by the authors), it was observed that the awareness and preparedness around the CSFs for ERP project implementations within BGT, the Health Services, and An Post were inadequate for undertaking their respective ERP projects. On the other hand, SerCom’s decision-makers displayed a greater awareness and preparedness around the same CSFs within their ERP project initiative and as a result can be characterised as being mindful (Swanson and Ramiller, 2004) in their approach to their project. Against this backdrop, which serves to characterise the process followed by the organisational personnel involved in each of the four projects, the CSFs for ERP project implementations and their presence or absence in the preparations of each organisation are discussed in the next section. Based on these observations, we then derive a set of CSFs and their relationships which are particularly important for managers in ensuring that the most important and difficult aspects of their ERP projects are handled successfully.

CSFs for ERP Project Implementations

In preamble to this discussion, our observations in the four cases lead to the conclusion that certain decisions taken at the outset of the project based on the awareness and preparedness of managerial decision-makers around the CSFs for ERP project implementations, can:

- affect the impact of the project/investment on the organisation,
- account for the problems that an organisation experiences throughout the execution phase of the project implementation, and
- impact on the desired outcomes of the project.

These conclusions are supported by the evidence presented in Table 4, which provides an insight into each of the organisation’s experiences, organised around the CSFs for ERP project implementations presented earlier in Table 1.

The appreciation within SerCom to understand the business implications of the project from the outset and embrace an enterprise-wide view for the project initiative was extremely high. For example, SerCom took a strategic view that their business model was changing and acted mindfully with regard to prioritising critical aspects of the business and ensuring that these business operations were represented on the ERP system from the outset. Therefore, SerCom management considered the impact of the ERP package on the entire organisation and isolated critical functional areas. From the outset, the awareness of SerCom management dictated that no attempt be made to represent all functional areas on the system at once, only those earmarked as critically important, in view of future business changes needed. As a result, this ensured that the scope of the project was manageable and the project could be completed in a shorter timeframe. Therefore, as a result of the management’s awareness to isolate and prioritise business requirements, SerCom achieved their objectives within a short timeframe and 100% of the functionality required was delivered, using a small number of highly skilled and knowledgeable business and IT personnel.

An Post demonstrated a high level of awareness for the project initially, however, their preparation was inadequate at the outset and as a result they faced a number of setbacks throughout the lifecycle of the project. An Post can be characterised as a deviant case, in that managers displayed a high awareness of what was involved, but this awareness translated into less than adequate preparations being made for the project. While decision-makers were aware of what was needed, in theory, for their ERP initiative, they did not fully appreciate the importance and complexities of the implementation process, in practice, when making preparations for the project. While the ERP project was considered the largest ever business process project within An Post it was not approached as a 'priority one' concern by all business units.

<table>
<thead>
<tr>
<th>CSF</th>
<th>SerCom</th>
<th>BGT</th>
<th>HSE</th>
<th>An Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF1</td>
<td>P An understanding that the business model was</td>
<td>A Very little appreciation that the nature of the business was</td>
<td>A Very little consideration was given to the business need for the</td>
<td>P Managers anticipated a changing competitive business</td>
</tr>
</tbody>
</table>

Sammon et al.

**CSF Relationships in ERP Project Implementations**

<table>
<thead>
<tr>
<th>CSF</th>
<th>P</th>
<th>A</th>
<th>NOTE: In this Table the P and A represent presence and absence respectively</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF2</td>
<td>The project was the priority one concern of the CEO who was also the chairperson of the steering committee</td>
<td>The ERP project was never given ‘priority’ and there was a lack of conviction at top levels to drive the project</td>
<td>A</td>
</tr>
<tr>
<td>CSF3</td>
<td>The requirements of the business were prioritised and consensus was reached as to the critical elements in each area in addressing the business needs. This guided the module selection / implementation and 100% of what was required was delivered</td>
<td>A poorly defined set of business requirements was developed at the outset, providing a ‘wish-list’ as opposed to critical requirements. The ERP did not have the capabilities to meet all business requirements</td>
<td>A</td>
</tr>
<tr>
<td>CSF4</td>
<td>Active involvement of key personnel in the project and all project team members were full-time on the project</td>
<td>Where business personnel were involved on the project, it was still driven by IT, and the IT personnel were telling the business personnel what to do</td>
<td>A</td>
</tr>
<tr>
<td>CSF5</td>
<td>Communication from the top ensured the project was a priority throughout the organisation</td>
<td>No central steering group existed governing the project which led to poor organisational communication and managerial support</td>
<td>A</td>
</tr>
<tr>
<td>CSF6</td>
<td>A complete blue-print was developed with prioritised business functions and the scope was defined accordingly</td>
<td>Poorly defined scope and automated site specific ‘as-is’ processes to varying degrees</td>
<td>A</td>
</tr>
<tr>
<td>CSF7</td>
<td>The project was completed within a short timeframe and within budget</td>
<td>The project was not fully completed within the timeframe and the true accumulated cost of selecting, implementing, supporting and modifying the ERP package over the past decade was unknown</td>
<td>A</td>
</tr>
<tr>
<td>CSF8</td>
<td>A level of commitment existed to do whatever it took and to embrace change to ensure the future growth of the business. Leading members of each functional area were involved, under the guidance of a strong project manager</td>
<td>Getting buy-in from business personnel was difficult because employees did not want to take part in a project that was perceived as extra work and responsibilty. Some business personnel were slow to buy into the project and take ownership because it was seen as an IT initiative</td>
<td>A</td>
</tr>
</tbody>
</table>

**Table 4. Informants’ Retrospective Accounts of the CSFs for ERP Project Implementations—For CSFs, see, Table1.**

For example, An Post was aware of the importance of a steering committee for the project, but they failed to ensure that the steering committee remained for the full duration of the ERP project. Furthermore, An Post understood the importance of documenting requirements throughout the project, but preparations were not made to ensure that this documentation of requirements was produced throughout phase 1 of the project. As a result of this, when end-users expressed dissatisfaction with the functionality of the ERP package in meeting their requirements, post ‘go-live’, there was no requirements documentation available to support the emergence of an easy solution to this problem. These, as well as other, examples of a lack of preparedness left An Post with less than desirable project outcomes where the project failed to deliver real business value and meet the business objectives set for the project, resulting in the business never properly taking ownership of the project.
BGT and the Health Services share a number of common characteristics in terms of their experiences with their ERP project initiatives. Both organisations found themselves undertaking an IT initiative from the outset. Therefore, the priority of the project was not set at a high enough level. Furthermore, the project was never given a set of clear and consistent (universally understood) strategic business objectives as a platform to guide decision making during the project (although it is clear from our interviews that major changes in the environments of both organisations were requiring major changes to the business model) and the criticality of adoption was not communicated from the top level. It was a feature of both organisations that personnel were not seconded onto the project team full-time and as a result their commitment to the project was reduced as they were also performing their daily roles in parallel. No real formal team structure was put in place and the roles and responsibilities of project team members were poorly defined, leading to a lack of ownership for the project by team members. This lack of ownership led to a less than successful project outcome. A failure to allocate sufficient business resources to the ERP project, in both these cases, also compounded the impact of the problem of standardisation, in that, the business personnel were not adequately skilled to perform their roles on the project team, in terms of understanding the business and driving change to introduce standardisations at an organisational level (ie across sites). It is obvious that a lack of preparedness for such a key issue as standardising to an enterprise-wide business process infrastructure from the outset, led to an extended project timeframe, with an associated escalation in costs, and a poor fit between the software and the business. As a result, no real long-term business value-added was realised from undertaking the ERP projects.

Finally, within BGT, the Health Services and An Post, the rationale for adopting their initial approach to the implementation of the ERP package hinged on the organisational structure and the mindset of those involved in the project at the time of initiation. Therefore, unlike SerCom, these three organisations demonstrated a lack of appreciation of what an enterprise-wide view of the organisation entails, for example in terms of business process infrastructure, where very little attention was attributed to standardising processes to drive out efficiencies in the business. Therefore, the CSFs for ERP project implementations were not fully understood within these three cases.

THE CONCEPTUAL MODEL: AN IMPROVED UNDERSTANDING OF THE RELATIONSHIPS BETWEEN CSFS FOR ERP PROJECT IMPLEMENTATIONS

As a result of within-case and cross-case analysis it emerged that each of the organizations experienced a unique ‘set of issues’ around a common set of CSFs. Furthermore, based on the analysis conducted on the four cases it was evident that problems during project implementation related to decision-makers’ myopic mindset and low levels of awareness of these CSFs for ERP project implementations at the outset of the ERP project. Therefore, as a result of gaining a deeper understanding of these implementation problems across the four cases studied (using the mental maps of informants within each case) a Conceptual Model of CSF Relationships was developed (Figure 1).

While the conceptual model appears to represent a logical link between the comprising variables (CSFs) it does also represent the complexity of factors critical to the undertaking of an ERP project, in terms of the interconnectedness of these factors. As an example, top management commitment and support, while necessary for the successful implementation of an ERP project is not in itself sufficient. It is linked and has a strong relationship with effective communication, for instance, and in itself can be impacted by the existence of actual strategic business need for an ERP project initiative. As a further example, a lack of top management commitment and support can have a negative impact on effective communication and as a result have a serious negative impact on the required organizational buy-in needed for an ERP project. This in turn diminishes the sense of ownership of the project amongst organizational personnel directly involved in the project and by end-users of the resulting systems infrastructure. Therefore, this provides an insight into the characterization of the relationships between the CSFs for ERP project implementations.
For the purposes of usefulness and readability, the following aspects of Figure 1 are important:

- the conceptual model presents each of the CSFs in a simplistic fashion while also maintaining the complex relationships (interconnectedness) between the CSFs,

- generating several iterations of the model, the thought process behind managers taking action in line with each of the CSFs emerged. The blue colored boxes represent actionable CSFs and the red boxes represent outputs resulting from actionable CSFs. Furthermore, the green and red arrows represent the interconnectedness and nature of the relationships between the actionable and non-actionable CSFs,

- as a result of the analysis it emerged that the interconnectedness of the CSFs impacted an organization’s ability to achieve their desired project outcomes. Therefore, to formalize these observations, the conceptual model came to include what we define as the three pillars of ERP implementation which are critical to achieving what is termed a successful ERP project outcome. These three pillars are named: Categorized Functionality, Project Management Success, and Acceptance of Change. In fact, this embraces the argument of King and Burgess (2006, p.67) observing the need to provide a dynamic model of CSFs for ERP implementation, linked in causal chains, stating that “outcomes are explicitly included in the model…. which after all, are the reason for the investment in the new technology in the first place”. Our definitions of these three pillars are:

  o Categorized Functionality: the implemented modules should fit with the prioritized business requirements identified in support of the critical aspects of the organization’s operations.

  o Project Management Success: the measure of success in the management of an ERP project is ensuring that the project is completed in a relatively short time-frame and within the budget allocated. In order to achieve this success in project management, the time-frame and the budget allocated should be well defined and determined by the scope of the ERP footprint.

  o Acceptance of Change: an ERP project will inherently introduce change into an implementing organization. In order to achieve this outcome, the required organizational buy-in and ownership of the project needs to exist amongst all stakeholders in the organization.
Ultimately, the model provides an easy to use and interpretable representation of the CSFs for ERP project implementations, while still reflecting the complexity of the phenomena under study. This was of extreme importance as an output of this study, due to the fact that an ability to provide a useful and practical model to managers considering undertaking an ERP project is considered the key contribution to improved managerial understanding. For example, in practice, organizational decision-makers take action based on their understanding of the importance of allocating their best business resources, as their representatives, to the ERP project team. It can be argued that a mindful manager should consider the outcomes of their decisions, by appreciating the impact of their actions or inactions, on the overall welfare of the project. Furthermore, the commitment and support of the manager to the project should be reflected in their involvement in ensuring that effective communication channels exist (for example their active involvement on the project steering committee) and as a result they will ensure that the best internal business resources will become project team members. In fact, these actionable CSFs impact further on the desired outcomes of the ERP project (the three pillars of ERP implementation as in Figure 1). It is important to appreciate that the scenario illustrated here requires more than just an appreciation of simplistic lists of CSFs. As a result, the value-added of the Conceptual Model of CSF Relationships can be appreciated in this instance.

CONCLUSION

Despite research reports being published throughout the past fifteen years documenting various CSFs for ERP project implementations, there has been a lack of understanding around the relationships between these factors that combine to drastically affect the implementation of the ERP project beyond the intended plan at the initial phase of the project lifecycle. The novel contribution of this paper is the formulation of the Conceptual Model of CSF Relationships which progresses the traditional theoretical concepts underpinning CSFs, from simple classifications and CSF lists, to illustrating the interconnectedness defining the CSFs for ERP project implementations. We believe that this contribution can raise the mindfulness (Swanson and Ramiller, 2004) of an organization with regard to their approach to pursuing and investing in ERP packages. To conclude, while the data collected from the four cases studied in this research may be considered somewhat dated, the relevance to present day organizations still holds true, specifically, in light of the fact that our research findings led to the development of the conceptual model. Furthermore, the practicality of this model is self-evident as benefit realization from ERP-based Transformation investments is still a much debated issue requiring attention. The analysis presented throughout this paper has moved to raise the level of managerial awareness around the relationships between CSFs for ERP project implementations, and the impact of the presence or absence of these CSFs on achieving desirable ERP project outcomes. Therefore, this paper provides a practical model to implementing organizations in an effort to assist managers become more mindful of the true nature and impact of the CSFs for ERP project implementations.

REFERENCES


