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A Framework for Successful Enterprise Systems Implementation: Preliminary Findings from a Case Study

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Abstract

While critical success factors (CSFs) of enterprise system (ES) implementation are mature concepts and have received considerable attention for over a decade, researchers have very often focused on only a specific aspect of the implementation process or a specific CSF. Resultantly, there is (1) little research documented that encompasses all significant CSF considerations and (2) little empirical research into the important factors of successful ES implementation. This paper is part of a larger research effort that aims to contribute to understanding the phenomenon of ES CSFs, and reports on preliminary findings from a case study conducted at a Queensland University of Technology (QUT) in Australia. This paper reports on an empirically derived CSFs framework using a directed content analysis of 79 studies; from top IS outlets, employing the characteristics of the analytic theory, and from six different projects implemented at QUT.

Keywords

Enterprise Systems, ES, Critical success factors, CSFs, Analytic theory.

INTRODUCTION

Advances in Information Technology (IT) regularly redefine business operations for many organisations. Consequently, organisations continue to increase spending on IT applications and their budgets continue to rise (Gartner, 2010). One of the prominent trends is the adoption of Enterprise Systems (ES)[1], the most important and expensive development of organisational use of IT (Rabaa'i, 2009). ES are *"large-scale, real-time, integrated application-software packages that use the computational, data storage, and data transmission power of modern information technology (IT) to support processes, information flows, reporting, and business analytics within and between complex organizations"* (Seddon, Calvert, & Yang, 2010: 305).

ES can link different areas of an organisation, such as manufacturing, order management, financial systems, human resources, suppliers and customers, into a tightly integrated system with shared data and visibility (Chen, 2001). ES hold the promise of improving business processes and decreasing costs (Beheshti, 2006; Nah, Lau, & Kuang, 2001), as these systems facilitate communication and coordination, centralise the administrative activities, increase the ability to deploy new information system functionality and reduce information system maintenance costs (Siau, 2004). A successfully implemented ES can be the backbone of business intelligence for an organisation (Rabaa'i, Bandara, & Gable, 2010; Rabaa'i, 2009; Rabaa'i, Bandara, & Gable, 2009), by giving managers an integrated view of the business processes (Nash, 2000; Parr & Shanks, 2000).

Despite the significant benefits that are associated with the implementation of ES, implementing an ES successfully is problematic, costly and complex (e.g. Al-Mashari, Al-Mudimigh, & Zairi, 2003; Rabaa'i, 2009; Umble, Haft, & Umble, 2003) , and often shows high failure rates or even abandonment due to lack of functional fit[2] with the organisation (Seddon et al., 2010). However, a structured, managed,

[1] Enterprise System (ES) is synonymous with the term Enterprise Resource Planning (ERP) see Klaus et al. (2000) for more details.

[2] *"Functional fit is the extent to which the functional capabilities embedded and configured within an ES package match the functionality that an organization needs to operate effectively and efficiently"*(Seddon et al., 2010: 307)

controlled, and disciplined approach can facilitate the implementation process (Umble et al., 2003). The literature (e.g. Al-Mashari et al., 2003; Bancroft, Seip, & Sprengel, 1998; Bingi, Sharma, & Godla, 1999; Ehie & Madsen, 2005; Grabski & Leech, 2007; Holland, Light, & Gibson, 1999; Markus & Tanis, 2000; Nah & Delgado, 2006; Nah et al., 2001; Umble et al., 2003) offers many critical success factors (CSFs) that influence, guide and directly impact ES implementations' outcomes.

CSFs are (1) activities that make differentiations between success and failure or differentiations between incremental results and breakthrough results (Banfield, 1999), (2) useful as they provide clear insight and guidance on where to focus special and continual attention and consideration in planning for an ES implementation (Shanks et al., 2000), (3) a mixture of several critical factors that will result in the desired outcomes, one single critical factor by itself will not ensure the success of an ES implementation (Verville & Bernadas, 2005).

While CSFs of ES implementation are mature concepts and have received considerable attention for over a decade, researchers have very often focused on only a specific aspect of the implementation process or a specific CSF. In addition, the scope and approaches of these studies have varied and there is little consensus on the appropriate set of CSFs of ES implementation. These studies identified and used both subjective and objective CSFs and have employed many methodologies such as case studies and surveys. On the other hand, CSFs studies have varied greatly in terms of research paradigm, assessment level, context, perspective, and data collection approach. Resultantly, there is little research documented that encompasses all significant CSF considerations. Though the development of different perspectives on CSFs has been an important contribution, existing discussions on this issue are scattered, limited to a single perspective, cannot be aggregated in any comprehensiveness way, and lack a common theme. As a result, comparisons of results across CSFs studies are complicated and impede the establishment of a cumulative research tradition. This study is motivated by the continuous growth of ES market and high implementation failure rates or even abandonment. This paper is part of a larger research effort that aims to contribute to understanding the phenomenon of ES CSFs. The study aims to address the main research question: *"What are the critical success factors of enterprise system implementation?"*

The remainder of the paper will first present a brief literature review followed by the research design; introducing the two-phased approach. Section four presents the content analysis and is divided into three subsequent sections that demonstrate: the constitution of the pool of success factors for the proposed CSFs framework, the aspects of the analytic theory, and the deriving of the a-priori CSFs framework. The case study is presented in section five. Finally, the paper concludes with a summary and a research outlook.

ENTERPRISE SYSTEMS (ES) CRITICAL SUCCESS FACTORS (CSFS)

Digman (1990: 247) defined critical success factors (CSFs) as "*The areas where things must go right for the business to flourish"*. Okland (1990: 325) defined them as: *"What the organisation must accomplish to achieve the mission by examination and categorisation of the impacts"*. In ES context, CSFs are: *"a set of factors that need special considerations and continual attention for planning and implementing an ES"*.

There are many factors, identified in the literature, which influence and guide ES implementations and which have a direct impact on the implementation outcomes. However, researchers have very often focused on only specific aspects of the implementation process or specific CSFs. While some investigators had set out to prepare a taxonomy of CSFs (Al-Mashari et al., 2003; Kalling, 2003; Siriginidi, 2000; Umble et al., 2003) based on literature reviews, others had presented CSFs according to the stages of the implementation. For example, Chen (2001) attempted to identify CSFs according to planning stages, and similarly, Nah et al. (2001) and Somers & Nelson (2001) presented CSFs by stage of implementation. Others had been more focused on a specific area of the implementation, or had attempted to categorize CSFs according to planning frameworks. For example, Trimmer et al. (2002) offered a list of generic CSFs based on a literature review, but then expanded this with a list of CSFs specific to health care, compiled through their own case studies. Additionally, research by Davison (2002) involved a case study on a Hong Kong University to learn more about culture as a factor that affects success; Abdinnour-Helm et al. (2003) recognized the importance of employee attitude to ES implementation success. Other researchers, considered different perspectives: Tarafdar & Roy (2003) interviewed executives about the issue of organisational acceptance; Robey et al. (2002) used case study to address the issue of knowledge barriers. Dong (2001) focused on the influence of top management support; Gulledge & Sommer (2002) studied business process management as a CSF.

Parr & Shanks (2000) highlighted ten factors necessary for successful ES implementation based on interviews with 10 experts who had participated in a total of 42 ES implementation projects. The factors were divided into four groups - management, personnel, software, and project. The three most important factors identified were management support of the project team and the implementation process, a project team that has the appropriate balance of business and technical skills, and a commitment to change by all stakeholders. Holland and Light (1999) provided a CSF framework consisting of twelve factors, which were divided into strategic and technical factors to illustrate the framework on two ES implementation projects.

Shanks et al. (2000) identified eleven critical success factors for ES projects, drawn from two case studies on China and Australia. The factors were top management support, external expertise, balanced project team, data accuracy, clear goals, project management, change management, education and training, presence of a champion, minimal customisation, and using the best people full-time. However, only top management support and the formations of a balanced project team were common to both firms throughout the implementation stage. Nah et al. (2001) reviewed ten articles written between 1998 and 2000 to classify the key critical factors for a successful ES implementation. Eleven critical factors were identified, such as ES teamwork and composition, change management program and culture, top management support, business plan and vision, business process reengineering (BPR) and minimum customisation, effective communications, project management, software development, testing and troubleshooting, monitoring and evaluating performance, project champion, and appropriate business and IT legacy systems. However, the authors did not specify which methods (case studies, empirical research or other methods) were used to determine the factors listed above.

Al-Mashari et al. (2003) provided a comprehensive taxonomy of ES critical factors. The authors identified twelve factors and divided them into three groups linked to the stages of an ES implementation - setting-up, deployment, and evaluation. The factors identified were management and leadership, visioning and planning, ES package selection, communication process management, training and education, project management, legacy systems management, system integration, system testing, cultural and structural changes, and performance evaluation and management. However, the taxonomy's emphasis that a clear vision and business director is fundamental for the success of ES system implementation because the most essential element of success and the pre-requisite for successful and effective ES implementation is leadership and commitment. Also, Umble et al. (2003) established a number of critical success factors based on previous studies and further applied the factors in an ES implementation case study. The factors were clear understanding of strategic goals, commitment by top management, excellent project management, organisational change management, a great implementation team, data accuracy, extensive education and training, focused performance measures, and multi-sites issues. Somers and Nelson (2004) analysed critical success factors from 86 organisations that were completing or had completed the implementation of ES- the authors identified and ranked 22 CSFs. The top five were top management support, project team competence, project champion, inter-departmental cooperation, and clear goals and expectations.

Verville and Bernadas (2005) presented ten critical success factors for successful ES acquisition outcomes by using three case studies. The factors were divided into two dimensions, which related to the acquisition as a process and to people within the process. The factors were: a planned and structured process, rigorous process, definition of all requirements, establishment of selection and evaluation criteria, accurate information, clear and unambiguous authority, careful selection of the acquisition team members, partnership approach, user participation, and user buy-in. Finally, Nah and Delgado (2006) reviewed the literature to provide a comprehensive list of critical success factors related to ES implementations and upgrade. Based on the work by Markus and Tanis (2000), Nah and Delgado organised these factors into seven main categories: (1) Business plan and vision; (2) Change management; (3) Communication; (4) ES team composition, skills, and compensation; (5) Project management; (6) Top management support and championship; and (7) System analysis, selection, and technical implementation.

RESEARCH DESIGN

The main objective of the overall research study is to develop a standardised, simple, yet generalisable, framework for ES CSFs. Hence, the study employs a multi-method research design, extending the research cycle proposed by MacKenzie & House (1979) and McGrath (1979) for developing and validating the proposed ES CSFs framework. The research design, depicted in Figure 1, entails two main phases and two surveys: (1) an exploratory-phase, to develop the hypothesized framework, and (2) a confirmatory-phase, to test the hypothesised framework against new data gathered.

The exploratory phase, adheres with the two-step approach of (Burton-Jones & Straub, 2006) for operationalizing factors and identifying measures, aims to: adequately account for the context of CSFs of ES implementation, ensure framework completeness, and ensure that an appropriate and complete choice of factors are considered. The exploratory phase consists of a three-phase approach, a content analysis, and case study, *section A of the overall research design and the main focus of this paper*, followed by a specification survey (the 1st survey). **The content analysis**, akin to the 'function' phase of the Burton-Jones & Straub (2006) approach, is intended to identify the salient factors for the proposed framework. Herein, the study attempts to identify factors from the existing CSFs of ES implementation literature, based on conceptual arguments. **The Case Study** aims to develop a grounded understanding of successful ES implementation and investigate the applicability and the completeness of the factors and measures identified from the content analysis. The factors, that were identified in the content analysis and investigated in the case study, will later become the basis of the a-priori framework to be operationalized in the specification-survey. **The Specification-survey (the 1st survey)** aims to further specify and test the a-priori framework employing data gathered (primarily 7-point Likert scales) with an instrument that operationalises the factors and measures derived from the content analysis and investigated in the case study. **The Confirmation-survey (the 2nd survey)** aims to further validate the CSFs framework and instrument deriving from the exploratory-phase, and to further illustrate the mutual exclusivity and additivity of the factors and measures in the framework using confirmatory data analysis techniques and new data. To complete the research cycle proposed by MacKenzie & House (1979), construct validation tests similar to the Specification-Survey will be conducted on the Confirmation-Survey data.

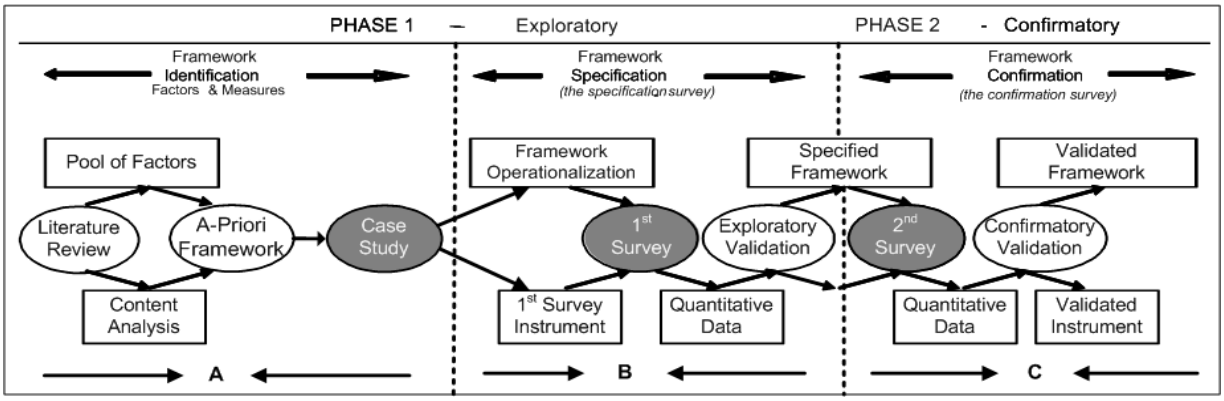

Figure 1: Overall Research Design

CONTENT ANALYSIS

Content analysis is a widely used in qualitative research technique and has been defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Harwood & Garry, 2003; Stemler, 2001; Weber, 1990). Content analysis has three distinct approaches: conventional, directed, or summative (Hsieh & Shannon, 2005). Conventional content analysis, also described as inductive category development, is generally used with a study design whose aim is to describe a phenomenon. This type of design is usually appropriate when existing theory or research literature on a phenomenon is limited. Directed content analysis, as a deductive category application, is often used when existing theory or prior research exists about a phenomenon that is incomplete or would benefit from further description. The goal of directed content analysis is to validate or extend conceptually a theoretical framework, model or theory. Summative content analysis starts with indentifying and quantifying certain words or content in text with the purpose of understanding the contextual use of the words or content. This quantification is an attempt to infer meaning rather than to explore usage, so it goes beyond mere word counts to include latent content analysis. Due the exploratory nature of the study and considering the advantages and the disadvantages of these approaches, we employ the Directed Content Analysis in this paper.

In order to contain the study effort, the content analysis: (1) was constrained to the period 1995-2009, (2) was constrained to top-tier IS outlets[3], and (3) considered 79 studies using title, abstract and

[3] The search captured core IS outlets which included sources from top-tier IS journals, proceeding from major IS conferences, and other recognised sources that seemingly published (after a preliminary database analysis) about CSFs of ES implementation, example include, but not limited to: MIS Quarterly (MISQ), Information Systems Research (ISR), Management Science (MS), Journal of MIS (JMIS), Decision Sciences (DS), Information &

keywords search of a string of words related to the topic domain. The following sections will discuss the constitution of the pool of factors for the proposed CSFs of successful ES implementation framework, the analytic theory aspects of the proposed framework, and deriving the a-priori framework.

Constitution of the Pool of factors for the Proposed CSFs Framework

For developing the proposed CSFs of successful ES implementation framework, a thorough literature review was conducted to identify all candidate factors mentioned as CSFs of ES implementation. We note that there is agreement in the reviewed literature that successful ES implementation consists of a combination of related factors and measures.

Since the purpose of the proposed framework is to expose the underlying factors of successful ES implementation; a comprehensive list of factors was thus extracted yielding a total of 29 success factors[4], including redundant factors, these factors were further investigated and discussed in the Deriving the A-Priori Framework section.

Analytic Theory Aspects of the Proposed CSFs Framework

The objectives of the exploratory phase of this research have a direct correspondence with the type 1 theory – analytic theory proposed by Gregor (2006). Analytic theory, the most basic type of theory, is necessary for the development of all of the other types of theory. In Building a framework/taxonomy, the analytic theory is an important initial step towards building a theory and to derive a deeper understanding of a phenomena of interest. *"They describe or classify specific dimensions or characteristics of individuals, groups, situations, or events by summarizing the commonalities found in discrete observations"* (Gregor, 2006: 623). According to Gregor, the inter-relationships between the theories suggest that components of analytic theory are necessary before theory of other types can be expressed clearly; in order to formulate a theory for better explanation (Type II), prediction (Type III), testing (Type IV), and ultimately practice (Type V).

Hence, the analytic theory approach will be used to build a clear definition of the factors and measures. Analytic theory approach specifically seeks answering the "What is" question as opposed to explaining causality or attempting predictive generalizations is the essence of the approach (Gregor). The Analytic Theory aspects that will be employed in developing the proposed framework are: (1) framework completeness – include all relevant factors and measures, where any ill-conceived additions or omissions good and bad, high and low, positive and negative may critically mask, neutralize or distort results, (2) framework parsimony – where only the simplest and smallest relevant dimensions and measures are included, and (3) mutual exclusivity - where each factor and measure address a unique factor and measure of ES successful implementation without having overlapping factors and measures.

Deriving the A-Priori CSFs Framework

In the interest of achieving the abovementioned qualities of the Analytic Theory (Gregor, 2006), the derived list (the 29 success factors) was carefully analysed to eradicate redundancies and to ensure the mutually exclusive, parsimony, and completeness of the factors. In order to minimise individual errors of judgment, the synthesisation process was conducted by three academic experts (coders) in the field. Comparison of the individual synthesization revealed an average inter-coder agreement of 85 percent, higher than the 70 percent recommended by Krippendorff (1980). Discrepancies were discussed until a consensus was reached. We removed a total of 14 factors as a result, leaving 15.

The proposed framework consists of fifteen CSFs, including: Top management support and Commitment (F1), Change management (F2); Business process reengineering (BPR) and system's customisation (F3); Training and Education (F4); Project management (F5); Team composition (F6); Visioning and planning (F7); Consultant selection and relationship (F8); Communication plan (F9); ES selection (F10); Project champion (F11), Implementation strategy and timeframe (F12); ES testing (F13); Post-implementation evaluation (F14); and Empowered decision making (F15). Table 1 defines

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Management (I&M) and European Journal of Information Systems (EJIS), as well as the International Conference on Information Systems (ICIS), the Pacific-Asia Conference of Information Systems (PACIS), the European Conference of Information Systems (ECIS), and the Australian Conference of Information Systems (ACIS).

[4] The page restriction in this submission prohibits the inclusion of all identified factors, but they are available upon request from the author.

the CSFs of the a-priori framework and provides further evidence of the analysis effort. It also shows the number of citations, reported in the reviewed literature, for each factor[5].

THE CASE STUDY

The case study method emphasises qualitative analysis. It enables the researcher to conduct the study in a natural setting and generate theory from practice, simultaneously enabling the researcher to understand the nature and complexity of the phenomenon investigated (Benbasat, Goldstein, & Mead, 1987; Yin, 2003). The use of a single case study here sought to be appropriate as it is neither intended to generalise nor to test a theory. Rather, the case study is descriptive in nature. Descriptive case studies are used to provide the researchers with a rich description of the phenomenon being studied (Yin, 2003).

Table 1. Frequency analysis and definitions of CSFs in the literature

CSF		# of instances cited in the literature	Definition
Top management support and Commitment	F1	28	The level of commitment by senior management in the organisation to the ES project, in terms of their own involvement and the willingness to allocate valuable organisational resources.
Change management	F2	28	The management of an approach that supports the change encountered by the implementation of ES.
Business process reengineering (BPR) and system's customisation	F3	27	The extent to which the implementation team accounts for business process reengineering and system customisation.
Training and Education	F4	24	The extent to which ES end-users have been trained and educated to properly use and benefit from the system.
Project management	F5	20	The management of the ES project including defining the project scope, aims, milestones, and plans.
Team composition	F6	18	The capabilities that should exist in a successful ES implementation team, such as an appropriate mix of members, representatives from all business units, team leadership and vision.
Visioning and planning	F7	16	The extent to which the project requirements, objectives, vision, and a comprehensive project plan developed to fit within organisation goals to ensure the success of an ES implementation
Consultant selection and relationship	F8	14	The extent to which ES consultant is part of the implementation process. It is also imperative to arrange for knowledge transfer from the consultant to the implemented organisation.
Communication plan	F9	14	This describes exchange of information (feedback and reviews) amongst the project team members and the analysis of feedback from users.
ES selection	F10	13	This involves the selection process of the ES that fits organisational needs.
Project champion	F11	12	The existence of a high level sponsor who has the power to steer the project, by setting goals and legitimate changes.
Implementation strategy and	F12	10	The extent to which the implementation strategy was addressed, this involves whether the implementation should be

[5] The page restriction in this submission prohibits the inclusion of all citation. Evidence of the origins of each of these factors can be provided upon request from the author.

timeframe			centralised or decentralised, considering the multi-site issue, and phased approach.
ES testing	F13	10	The extent to which the implementation team considers the inclusion of testing exercises and simulation exercises during the final stages of the implementation process.
Post-implementation evaluation	F14	9	The extent to which the implementation team considers the allowance of some kind of post-evaluation and the allowance of a feedback network.
Empowered decision making	F15	7	The extent to which the implementation team empowered to make necessary decisions.

Introducing the Case Study: Queensland University of Technology

Located in Brisbane, Australia, Queensland University of Technology (QUT) traces its origin back to 1849, with the establishment of Brisbane School of Arts. Through the years, the institution morphed several times, eventually becoming "Queensland University of Technology" in January 1989. Its original goal was *"To strengthen its distinctive national and international reputation by combining academic strength with practical engagement with the world of the professions, industry, government, and the broader community"* (QUT, 2009). This goal has inspired the University's dedication to the education of students, research in a broad range of disciplines, and service to the state's citizens. QUT is focused on being 'a university for the real world,' delivering relevant and practical courses leading to excellent graduate outcomes.

QUT also has a reputation for adopting latest technologies that support their core and supporting functions. QUT is part of a three-campus system and now is home to several national research centres and research institutes supported by government and philanthropic bodies. At present, QUT has approximately 5,000 employees (Full time equivalent). QUT's enrolment is approximately 40,000 students who study in the University's nine faculties- Built Environment and Engineering, Business, Science and Technology, Creative Industries, Law, Humanities, Education, Health, as well as QUT International College. QUT's annual budget is about AU$ 600 million in 2008.

Case Study Design

A case study protocol was designed to document all procedures relating to the data collection and analysis phases of the study. In-depth interviews were used to collect 'rich' evidence about ES projects. Seventeen interviews were conducted with 13 different interviewees.

The interviews were semi-structured, each completed within 1-2 hours. All interviews followed the same structure and format (as pre-specified by the case protocol). The interviews questions were open ended in nature, and all interviews were audio recorded and transcribed to ensure data accuracy and to enable a better collection and analysis of evidence. These interviews were then analysed. The sampling method employed for the interviews might be characterised as 'elite interviewing' (Marshall & Rossman, 1995), *"a specialized case of interviewing that focuses on a particular type of interviewee"* (p: 94) *"considered to be the influential, the prominent, and the well-informed people in an organization"* (p: 83).

The author commenced the data collection with the Associate IT director of the case site (QUT) as the key informant. He took part in the first series of interviews, and assisted with identification and access to other relevant respondents (consistent with intentions and goals of the elite interviewing approach employed). Thus, different IT and business managers representing different systems were contacted for data collection. Data analysis was predominantly done using NVivo 8.0 as a data management, analysis and summarising tool.

The Case Study Findings and Discussion

Analysis of the case study data was conducted mainly by coding the data, through the use of NVivo 8.0, thereby yielding counts and data points that were then analysed further. Following Bandara et al. (2004) suggested guidelines, for qualitative data analysis using NVivo 8.0, a predefined set of codes *"are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study"* (Miles & Huberman, 1984: 55) was derived as a starting point. These codes were refined, as the analysis evolved. A tree like node structure was initially created within NVivo to depict the success factors of the a-priori framework. The coding of the interview data was then conducted in three phases, following the similar phases as suggested by Bandara et al. (2004):

- Phase 1; coded any direct or implied existence of the factors (of the a-priori framework) within the data, simultaneously identifying any new factors.
- Phase 2; analysed the information already coded within phase 1to confirm the appropriateness with the categorisation.
- Phase 3; involves identifying the key words stated under each factors as a means of identifying potential sub-factor (which would be input for the design of the subsequent survey, hence, the results of this phase of coding are not discussed in this paper).

Table 2 summarises the total number of general citations, each time the factor was merely mentioned, within each interview transcript. The primary goal of this analysis was: (a) to evaluate the sufficiency of a-priori framework factors, and (b) to evaluate the necessity of each factor. Table 2 reflects 18 Success Factors (F1-F18). Factors (F1-F15) are the starting 15 success factors of the a-priori framework while factor (F16-F18) are new success factors identified through the case study, namely: (F16) Legacy system consideration, (F17) Data integrity, and (F18) Cultural change. The 'Project' column depicts the 6 different implemented ES projects[6].

Table 2. Summary Results of the Coding Phase

The Project	CSFs of the A-Priori Framework															New CSFs		
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18
Oracle Financials	14	16	7	13	10	11	8	14	12	9	3	3	9	2	2	2	14	1
ALESCO/Talent2 HR system	16	17	5	18	14	14	12	13	14	8	6	2	7	1	9	16	12	2
BEMIS facility management system	6	6	6	9	8	6	1	1	5	1	4	1	7	0	0	0	11	1
ARCHBUS facility management system	5	9	3	7	9	8	0	2	4	3	0	0	9	0	2	1	5	0
Students system	8	4	4	6	7	9	8	14	6	16	1	2	10	2	1	6	10	1
Students/Staff ID cards system	3	7	1	0	7	5	0	0	2	1	0	0	1	0	3	0	1	0
Total	52	59	26	53	55	53	29	44	43	38	14	8	43	5	17	25	53	5

In addition to analysing the citations for each factor, the author also (a) conducted redundancy checks with 'matrix intersection and difference', and (b) analysed each construct against its general citations and those instances in which it was specifically stated as important for a successful ES implementation. Gathering citations which merely mentioned a factor and comparing these with the instances that specifically stated its importance, was used to justify the criticality or necessity of each factor.

All CSFs, identified in the a-priori framework, 'except' (F14) were consistently cited across the 13 interviewees (business and IT mangers) and across 6 projects. The Change management factor (F2) was the most cited factor across all factors, and the Post-implementation evaluation factor (F14) was the lowest cited factor. The data indicated that the Post-implementation evaluation factor (F14) 'would be an 'indicator' factor that captures the project success rather than an 'influential' factor that will lead to the success of the project'. Moreover, no strong evidence was collected to justify having 'Post-implementation evaluation' as a separate factor in the modified framework (only 5 citations had mentioned its importance). Thus, it will not be included as a separate factor in the modified framework.

One case of overlapping was perceived across the projects between Top-Management support and commitment (F1) and Project champion (F11). Close analysis of the interviews data suggested that aspects of management support, such as: funding and management participation, played a significant role in successful ES projects. Thus, Top Management Support and commitment was kept as a separate factor. Though Project champion was at times referred to as management support, the phrases concurrently referred to other sub-factors of management support; such as: availability of funding, resources etc. This led us to conclude that Top management support and commitment is a multi-dimensional factor that should be included in the framework, and that Project champion is a sub-factor of Top management support that relates to the participation, decision-making, and power shown by managerial staff on the ES projects. Thus, Project champion will be removed from the framework and appropriate sub-factors to compensate for the removal of Project champion will be included within the Top management support and commitment factor. Interestingly, these findings are consistent with

[6] Further details about the individual projects that were analysed could be obtained from the author upon request.

Bandara et al. (2004) findings in relation to Top-Management support and commitment and Project champion.

Three new success factors were identified through the case study, (F16) Legacy system consideration, (F17) Data integrity, and (F18) Cultural change. The Legacy system consideration factor (F16) captures 'the extent to which the implementation team considers the legacy systems in place'. This factor was later redefined and justified with some reference to past literature (e.g. Al-Mashari et al., 2003; Nah et al., 2001) and will be included in the modified framework. The Data integrity factor (F17) was defined as 'the extent to which the implementation team ensures data currency and accuracy during in the final stages of the implementation process (before the go-live phase)'. This factor was later redefined and justified also with some reference to past literature (Somers & Nelson, 2001; Umble et al., 2003) and will also be included in the modified framework. In regards to the Cultural change factor (F18), the data indicated that cultural change would be influential for the 'initiation of an ES implementation project rather than for the success of the project'. Also, no strong evidence was collected to justify having 'cultural change' as a separate factor in the modified framework (only 5 citations had mentioned its importance). Additionally, Cultural change was a reflection on the Top management support and commitment as well as the Project champion factors. Thus, it will not be included as a separate factor in the modified framework.

In summary, analysis of the success factors resulted in: (1) Post-implementation evaluation, Project champion, and cultural change being removed from the modified framework, due to overlap with other more critical factor and /or due to lack of evidence to support their existence as a separate critical success factor; and (2) new success factor, Legacy system consideration and Data integrity factors will be included in the modified framework.

The modified CSFs framework includes 15 success factors, namely: Top management support and Commitment, Change management; Business process reengineering (BPR) and system's customisation; Training and Education; Project management; Team composition; Visioning and planning; Consultant selection and relationship; Communication plan; ES selection; Implementation strategy and timeframe; ES testing; Legacy system consideration; Data integrity; and Empowered decision making

SUMMARY AND OUTLOOK

In a study design with two interrelated phases – exploratory and confirmatory, this paper reports on the findings of the first two stages of the exploratory phase, where the purpose was to (1) identify the salient factors for the proposed framework from the existing CSFs of ES implementation literature, (2) aims to develop a grounded understanding of successful ES implementation and (3) investigate the applicability and the completeness of the identified factors through a case study. The overall study is novel in aiming to contribute to the goal of developing a robust framework, instrument, and approach for ES CSFs. The approach intended to include the characteristics of the Analytic Theory.

While the findings reported herein are valuable for IS academic and practitioners, they will be further tested, to overcome any limitation, in the specification survey (1st survey) and the Confirmation survey (2nd survey). A survey instrument will be designed to operationalise the 15 factors. The wording of each item will be carefully designed to insure all items are answerable by all employment cohorts (different end-user). The author has approached a number of Australian-based organisations and still awaiting for some approvals to commence the data collection.

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