

# **Revisiting Critical Success Factors for Enterprise Systems implementation: A Literature Review**

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## **Main message**

Provides a definitive literature review on the Critical Success Factors for Enterprise Systems implementation

## **Key Points**

Since their inception into work organisations, Enterprise Systems (ES) have proved challenging for many organisations to implement successfully. This study seeks to advance our understanding of the ES success literature by focusing on Harzing Journal ranked articles only that focus on the issue of “critical success factors” for ES implementation. The authors identify 34 key critical success factors that can provide both scholars and practitioners with a more holistic view of ES success.

## **J.E.L. classification codes**

D83, L53, L86

## **Introduction**

This study will conduct a literature review of critical success factors as deployed for the implementation of enterprise systems (ES). There have been many studies over the past two decades that have contributed to our understanding of the critical success factors for ES implementation. These systems often require significant organisational change and consequently attaining successful implementation remains challenging. Yet, despite the importance of understanding the routes to success when implementing ES, our understanding of the critical success factors remains anecdotal and case based within the extant literature.

Therefore, to support scholars and practitioners, this study proposes to address two key research questions.

1. How important is the concept of “success” within the ES literature?
2. What are the key critical success factors for ES implementations as cited within Harzing Quality ranked academic journals?

To address these research questions, this study will explore peer reviewed Journal articles as cited in Harzing’s (Harzing.com) Quality listing (most recent edition 11<sup>th</sup> February 2014). This paper contributes to current knowledge as it is the first study within the critical success factors literature on ES to focus on a review of a Journal Quality list, therefore the study seeks to identify the most empirically validated and comprehensive list of critical success factors (see Figure I) in order to support scholars in future inquiries and provide practitioners with a more holistic understanding of the critical factors required for ES success.

The authors will firstly provide a brief historical tour of ES and their respective implementation into work organisations. The methodology section will then discuss the approaches deployed to conduct this study, specifically focusing on the critical success factor studies (Bingi et al., 1999, Bradley, 2008, Koh et al., 2011, Yeh & Xu, 2013). In total 31 critical success factors are identified from the literature. The findings will then rank the most cited critical success factors and for illustrative purposes discuss the top ten success factors from Journals within the Harzing Quality list.

## Exploring Enterprise System Success

The introduction of information systems can greatly assist organisations in attaining greater effectiveness and efficiency. Information systems promise to increase rationalisation, reduce duplication, streamline business processes, integrate disparate systems, offer greater competitive advantage, increase innovation, and remove redundant managerial tasks through disintermediation (Loonam et al., 2013). From a brief historical overview of information systems, it becomes clear that organisations, and invariably information systems, have been looking to create a more integrated and seamless working environment. In particular, ES have been heralded as systems by which such 'seamless integration' can be achieved (Shaul & Tauber, 2013). ES are the internal technological hub of the enterprise allowing data from different business functions, mainly from finance, human resources, logistics, manufacturing, and sales and marketing to be manipulated and processed by a single software package such as SAP. ES are able to simplify, accelerate and automate much of the data transfers that must take place in organisations to guarantee the proper execution of operational tasks (Davenport, 1998). As Davenport goes on to say '*a good ES is a technological tour de force. At its core is a single comprehensive database. The database collects data from and feeds data into modular applications supporting virtually all of a company's business units, across the world*'. (1998: 123). According to Nah *et al.*, an ES is a packaged business software system that enables a company to manage the efficient and effective use of resources (materials, human resources, finance etc.) by providing a total, integrated solution for the organisation's information processing needs. It supports a process-oriented view of business as well as business processes standardised across the enterprise (2001).

Al- Mashari *et al.* (2003) informs us that the need to increase visibility in corporate data, create new or improve current business processes, improve responsiveness to customers, obtain tighter integration between systems, standardise computer platforms, increase flexibility, share information globally and improve business performance as reasons for the adoption of an ES. The adoption of these systems is also expected to provide significant financial benefits to the organisation (Leyh, 2012). The case literature illustrates this point with the Toro Co., saving \$10 million annually due to inventory reductions while Owens Corning claims that their ES software helped it to

save \$50 million in logistics, materials management and sourcing (Songini, 2001). Similarly, other cases reveal large savings in costs and increased levels of organisational effectiveness after ES implementation. Companies such as Geneva Pharmaceuticals, (Bhattacharjee, 2000), Lucent Technologies, (Francesconi, 1998), Farmland Industries (Jesitus, 1998), and Digital Equipment Corporation have had significant reductions in costs and increased organisational performance as a result of ES adoptions (Bancroft et al., 1998).

Yet despite such claims many implementations remain marred by poor performances and returns on investment (Loonam & McDonagh, 2011). Evidence from the case literature reveals that ES implementations have not run smoothly. For example, Allied Waste Industries Incorporated, found SAP too expensive and overly complicated to operate, while Waste Management Incorporated aborted its SAP implementation after it had spent \$45 million (Helm et al., 2003: 260). FoxMeyer Drug, a \$5 billion pharmaceutical company, filed for bankruptcy after major problems were generated by a failed ES implementation (Chen, 2001). Dell computers spent millions of dollars on an ES package before scrapping it because the system was too rigid for their expanding global operations (Stefanou, 2000). Other cases that experienced ES failures include; Applied Materials (Chen, 2001), Boeing (Barker & Mark, 2003), Dow Chemical (Olson et al., 2005), Hershey (Calogero, 2000), Kellogg's (Dey et al., 2010), and Mobil Europe (Yu, 2005). Research on information systems outcomes mirrors the case examples. Incidences of underperformance and failure are as high as 90% with up to 50% of IS initiatives being abandoned or failing outright and up to an additional 40% of IS initiatives being delivered late and over budget. Unfortunately, as few as 10% of IS initiatives may actually deliver promised business value (Loonam & McDonagh, 2004).

It therefore becomes important to ask; why are ES implementations delivering such inferior performances and in some cases complete failures. The literature points to issues relating to the

1. Financial costs and risks associated with implementation. According to Scheer and Habermann 'Bann, Peoplesoft as well as SAP calculate that customers spend between three and seven times more money on ES implementation and associated services compared to the purchase of the

software license. The reasons given for such costs are due to the scale of business process re-engineering (BPR) and change management issues involved in the implementation of the software (2000);

2. ES implementations require significant organisational change efforts, yet many installations often are viewed as technical implementations (Nour & Mouakket, 2011). As Umble et al. state, 'unfortunately, many chief executives view ES as simply a software system and the implementation of ES as primarily a technological challenge' (2003: 245);
3. ES implementations require organisational compliance in terms of business process compatibility (Davenport, 1998). Thus, the organisation needs to align to the system rather than the system adapting to organisational inflexibility. Frequently, however, customisation of systems is required to adapt to organisational processes. This can have significant lead time on costs, increase the amount of scope creep, and result in poor alignment between the organisation and system (Loonam & McDonagh, 2004).
4. Finally, ES implementations are complex and large and can therefore result in a cultural misfit between the package and the organisation (Davidson, 2002). This suggests ES packages are designed by Western vendors for western type organisations (Huang & Prashant, 2001). Countries such as Japan often find the implementation of such packages particularly difficult as there is a problem with the systems cultural identity (Soh et al., 2001).

## **Methodology**

This study seeks to build on the extant ES field by reviewing the critical success factor literature. The methodology adopts a systematic review of the literature in order to identify the key CSF studies. Specifically, the approach used in this section was informed by previous management literature reviews (Bakker, 2010 and Muller-Seitz, 2012, Okoli and Schabrahm, 2010), in order to illustrate the process of inquiry adopted by this study.

The study focused on double-blind peer-reviewed articles in English-speaking journals from the databases EBSCOhost and Emerald Management Xtra. To ensure the quality of

studies reviewed, journals ranked in the Harzing Quality (Harzing.com) listing only were considered (most recent edition 11<sup>th</sup> February 2014). This approach is feasible because it improves transparency and replicability (Muller-Seitz, 2012) and enables a thorough and systematic review that is similar to previous approaches (e.g. Bakker, 2010). Further, by adopting a specific focus on journals cited in the Harzing Quality list, the study focuses its review on general management, therefore removing ES articles that were beyond this disciplinary field.

Searches were conducted in the article titles for the keywords; “Enterprise Resource Planning”, “ERP”, “Enterprise Systems”, and “ES”. The choice of keywords is similar to other ERP literature reviews (e.g. Schlichter and Kraemmergaard, 2010) and yielded 768 articles from 113 Harzing Quality ranked Journals. The study then compiled these articles into a Microsoft Excel database, under the headings of (i) Journal name, (ii) article Title, (iii) article Authors, (iv) article Date, (v) article Keywords, and (vi) article Abstract. In order to increase the consistency and robustness of the findings, the study also surveyed previous reviews (Aloini et al., 2007, Moon, 2007, and Schlichter and Kraemmergaard, 2010).

The 768 articles were further searched using the keyword “success” to look for instances of successful ES implementation within the literature. This search revealed that there were 78 articles with the word “success” in their respective titles. This represents over 10% of the entire ES literature that focuses on issues of ‘success’ in terms of implementation within the Harzing Quality Journal list. Clearly, this is a topic that is of significant interest to scholars and practitioners alike over the past two decades. Further categorisation of the 78 success articles revealed a plethora of factors that respective scholars and studies deemed important to the successful implementation of ES. However, these studies remain disjointed in terms of a holistic understanding of what ES success was and how future implementations could align strategy to successful execution. Consequently, to further narrow the scope of this study and to more effectively understand the factors deemed critical to the success of ES implementations, a final search of the literature was conducted to reveal the “critical success factors” that respective studies deemed vital to ensuring successful ES implementation. Article titles, and where appropriate abstracts, were searched using

the keywords “critical success factors”, “critical issues”, and “critical factors”. A total of 37 studies within the ES literature were categorized from this review (see Figure 1 below). The authors next conducted an in-depth review of these 37 articles, by categorizing the studies that highlighted specific critical success factors for enterprise systems implementation within their findings. This revealed 20 CSFs studies within the Harzing Journal Quality list (see Figure 2 below)

	Journal	Article Title	Author(s)	Year
1	Information Systems Management	Critical Issues Affecting an ERP Implementation.	Bingi, Prasad, Sharma, Manesh K., Godla, Jayanth K.	1999
2	International Journal of Operations & Production Management	Critical success factors for integration of CAD/CAM systems with ERP systems.	Soliman, Fawzy, Clegg, Stewart, Tantoush, Tarek	2001
3	Business Process Management Journal	Critical factors for successful implementation of enterprise systems	Fiona Fui-Hoon Nah, Janet Lee-Shang Lau, Jinghua Kuang	2001
4	Knowledge & Process Management	Process Orientation through Enterprise Resource Planning (ERP): A Review of Critical Issues.	Al-Mashari, Majed	2001
5	Information & Management	The critical success factors for ERP implementation: an organizational fit perspective.	Kyung-Kwon Hong, Young-Gul Kim	2002
6	European Journal of Information Systems	Vicious and virtuous cycles in ERP implementation: a case study of interrelations between critical success factors.	Akkermans, H., van Helden, K.	2002
7	European Journal of Operational Research	Enterprise resource planning: Implementation procedures and critical success factors.	Umble, Elisabeth J., Haft, Ronald R., Umble, M. Michael	2003
8	Technovation	An investigation of critical management issues in ERP implementation: empirical evidence from Canadian organizations.	Kumar, Vinod, Maheshwari, Bharat, Kumar, Uma	2003
9	European Journal of Operational Research	Enterprise resource planning: A taxonomy of critical factors.	Al-Mashari, Majed, Al-Mudimigh, Abdullah, Zairi, Mohamed	2003
10	International Journal of Production Research	Critical elements for a successful enterprise resource planning implementation in small-and medium-sized enterprises.	Loh, T. C., Koh, S. C. L.	2004
11	International Journal of Production Research	Critical success factor framework for the implementation of integrated-enterprise systems in the manufacturing environment.	Ho, L. T., Lin, G. C. I.	2004
12	Business Process Management Journal	Success and failure factors of adopting SAP in ERP system implementation.	Vidyanaya B Gargeya, Cydnee Brady	2005
13	Journal of Enterprise Information Management	So you're thinking of buying an ERP? Ten critical factors for successful acquisitions	Jacques Verville, Christine Bernadas, Alannah Halingten	2005
14	International Journal of Production Research	Strategic success factors in enterprise resource-planning design and implementation: a case-study approach.	Dowlatshahi, S.	2005
15	International Journal of Production Economics	Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors (CSFs)	Albert Y.T. Sun, Abe Yazdani, John D. Overend	2005
16	Journal of Enterprise Information Management	Success factors in ERP systems implementations: lessons from practice	Piotr Soja	2006
17	Journal of Computer Information Systems	CRITICAL SUCCESS FACTORS FOR ENTERPRISE RESOURCE PLANNING IMPLEMENTATION AND UPGRADE.	Nah, Fiona Fui-Hoon, Delgado, Santiago	2006
18	Business Process Management Journal	Critical success factors for implementing enterprise portals: A comparison with ERP implementations	Ulrich Remus	2007
19	Business Process Management Journal	ERP implementation: a compilation and analysis of critical success factors.	Sherry Finney, Martin Corbett	2007
20	Journal of Computer Information Systems	CRITICAL SUCCESS FACTORS IN INTERNATIONAL ERP IMPLEMENTATIONS: A CASE RESEARCH APPROACH.	Plant, Robert, Willcocks, Leslie	2007
21	Journal of Manufacturing Technology Management	Critical success factors for implementing ERP: the case of a Chinese electronics manufacturer.	Woo, S	2007
22	International Journal of Technology Management	Understanding the critical factors effect user satisfaction and impact of ERP through innovation of diffusion theory.	Li-Ling Hsu, Lai, Robert S. Q., Yu-Te Weng	2008
23	International Journal of Accounting Information Systems	Management based critical success factors in the implementation of Enterprise Resource Planning systems.	Bradley, Joseph	2008
24	Business Process Management Journal	ERP implementation through critical success factors' management	Olivier Françoise, Mario Bourgault, Robert Pellerin	2009
25	International Journal of Manufacturing Technology & Management	A consensus on critical success factors for enterprise resource planning systems implementation: the experience of Malaysian firms.	Jafari, S. M., Osman, M. R., Rosnah, M. Y., Tang, S. H.	2009
26	Industrial Management & Data Systems	Successful enterprise resource planning implementation: taxonomy of critical factors.	Dezdar, Shahin, Sulaiman, Ainin	2009
27	Business Process Management Journal	The influence of business process management and some other CSFs on successful ERP implementation	Damijan Zobjek, Andrej Kovacic, Mojca Indihar Štemberger	2009
28	Business Process Management Journal	Understanding how project critical success factors affect organizational benefits from enterprise systems	Ann Zhong Liu, Peter B. Seddon	2009
29	Journal of Enterprise Information Management	Critical elements that discriminate between successful and unsuccessful ERP implementations in Sri Lanka	Vathsala Wickramasinghe, Vathsala Gunawardena	2010
30	Journal of Global Information Management	Critical Factors of ERP Adoption for Small- and Medium- Sized Enterprises: An Empirical Study.	She-I Chang, Shin-Yuan Hung	2010
31	Journal of Enterprise Information Management	Critical success factors for ERP implementations in Belgian SMEs	Claude Doom, Koen Milis, Stephan Poelmans, Eric Bloemen	2010
32	Journal of Strategic Information Systems	Drivers, barriers and critical success factors for ERP implementation in supply chains: A critical analysis	S.C.L. Koh, A. Gunasekaran, T. Goodman	2011
33	Expert Systems with Applications	Empirical study on influence of critical success factors on ERP knowledge management on management performance in high-tech industries in Taiwan	Pang-Lo Liu	2011
34	Industrial Management & Data Systems	CSFs along ERP life-cycle in SMEs: a field study	Levi Shaul, Doron Tauber	2012
35	European Journal of Operational Research	Managing critical success strategies for an enterprise resource planning project.	Yeh, Chung-Hsing; Xu, Yan	2013
36	International Journal of Production Economics	Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance?	Ram, Jiwat; Corkindale, David; Wu, Ming-Lu	2013
37	Business Process Management Journal	How "critical" are the critical success factors (CSFs)? Examining the role of CSFs for ERP.	Ram, Jiwat; Corkindale, David	2014

Fig. 1-Critical Success Factor articles for Enterprise Systems

## Analysing Critical Success Factors

Prior to discussing the CSF found from a critique of the ES literature, it is firstly important to discuss the rationale for exploring CSF studies. Implementation of an ES package is an expensive, lengthy and complex process, typically measured in millions of dollars with the investment both in the software and in related services such as consulting, training and system integration (Parr et al., 1999). Despite millions being spent on such implementations, the evidence from the case literature and empirical inquiry reveals that many implementations are not successful. These poor performances and inability to make a return on investment have resulted in the study of factors critical to successful ES implementation. These factors, have in turn given rise over the last decade to a plethora of ES CSF studies.

	Author(s)	Top Management Support	Project Team Competence	Clear Goals & Objectives	Project Management	Communication	Business Plan & Vision	Change Management	ERP Selection	Data Conversion & Quality	BPR	User Training & Involvement	Implementation Strategy	Consultant Selection & Relationship	Balanced Team	Project Champion	IT Infrastructure	Managing Cultural Change	Post-implementation evaluation	Team morale and motivation	Vendor ERP	Troubleshooting/crisis management	Legacy system consideration	System testing/reliability	Steering Committee	Business & IT alignment	Vendor Support	Organisational Structure/diversity	Software configuration	Management of Expectations	Dedicated Resources	Minimal Customisation	Operational Efficiency	Detailed Schedule	Internal Readiness			
1	Bingi et al, 1999	x	x								x											x																
2	Soliman et al, 2001	x				x						x															x											
3	Nah et al, 2001	x	x		x	x	x				x					x	x																					
4	Akkermans & van Helden, 2002	x	x	x	x	x	x	x	x							x										x				x								
5	Al-Mashari et al, 2003	x	x	x	x			x	x	x	x	x				x	x							x		x						x	x					
6	Umble et al, 2003	x	x	x	x			x	x	x		x																				x						
7	Gargeya & Brady, 2005	x	x				x					x		x										x	x				x							x		
8	Nah & Delgado, 2006	x	x		x	x	x	x	x	x																												
9	Soja, 2006	x	x														x																		x			
10	Woo, 2007	x	x		x	x					x	x													x													
11	Plant & Willcocks, 2007	x	x	x	x	x		x	x	x	x	x		x		x	x								x		x			x	x	x						
12	Finney & Corbett, 2007	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x														
13	Bradley, 2008	x					x					x		x		x									x	x												
14	Dezdar & Sulaiman, 2009	x	x		x	x	x	x			x	x		x		x	x							x	x		x											
15	Françoise et al, 2009	x	x		x	x	x	x			x	x				x	x						x	x				x	x									
16	Zabjek et al, 2009	x				x	x				x																											
17	Liu & Seddon, 2009	x	x		x	x		x	x		x	x	x	x	x		x	x													x							
18	Doom et al, 2010	x	x		x	x	x	x				x	x	x													x											
19	Koh et al, 2011	x					x			x														x												x		
20	Shaul & Taubor, 2012	x			x					x	x																x											

Fig. 2-Critical Success Factors studies for Enterprise Systems

Daniel (1961) is remarked to be one of the first to discuss the concept of ‘success factors’ in the management literature (Soliman and Clegg, 2001, Trimmer et al., 2002) however, it was Rockart who popularised the approach. Rockart defined CSF’s as the limited number of areas where things must go right for the business to flourish. The

author argued that managers need appropriate information in order to manage and that management performances should be measured continually in order to assist executives to identify their information needs. According to Trimmer et al., (2002) 'when CSF's are appropriately identified they represent areas in which excellent performance is essential to continued organisational success....where monitoring CSF's is a form of 'management by objective' monitoring those objectives or activities that have been identified as being essential to the continued well-being of the entity (p.114). Many ES studies have similarly adopted CSF's to highlight 'those few critical areas where things must go right' (p.292). Within the ES literature, critical success factors have also been widely recognised as a powerful enabler for identifying key issues for organisational attention prior to and during project implementation.

From the cross-analysis of the 20 studies in figure 2 above, this study found 34 individual CSFs that can support scholars and practitioners with a more holistic understanding of ES implementation. Figure 3 below provides us with a ranking of the importance of these 34 critical success factors across the 20 studies analysed.

### **Discussion & Findings:**

This study has applied a unique perspective on CSF analysis for ES by reviewing articles that are only published in Journals cited in Harzing's quality list. A number of key qualitative findings come to the fore after such a review, most notably; the identification of 34 individual critical success factors that will assist both scholars and practitioners in understanding more holistically ESs implementation process; the identification of 37 studies that focus on ESs CSF within the ES literature. However, only 20 of these studies actually outline specific CSFs. It appears that there are different interpretations amongst scholars as to what factors are critical for successful implementation; the concept of "success" is hugely important to the ES literature (from a database of 768 articles over 10% (78) of articles had the word "success" in their respective titles. Clearly, the enormity in cost, scope, and time required for ES implementation attracts a focus on ensuring successful outcomes; finally, of the 34 CSFS only seven are cited by ten or more studies. Clearly, this illustrates the importance of certain factors over others (as demonstrated in the discussion below).

In an effort to understand the contribution such CSFs have made towards ES implementations, this study considers the top ten cited CSF's from figure 3 above.

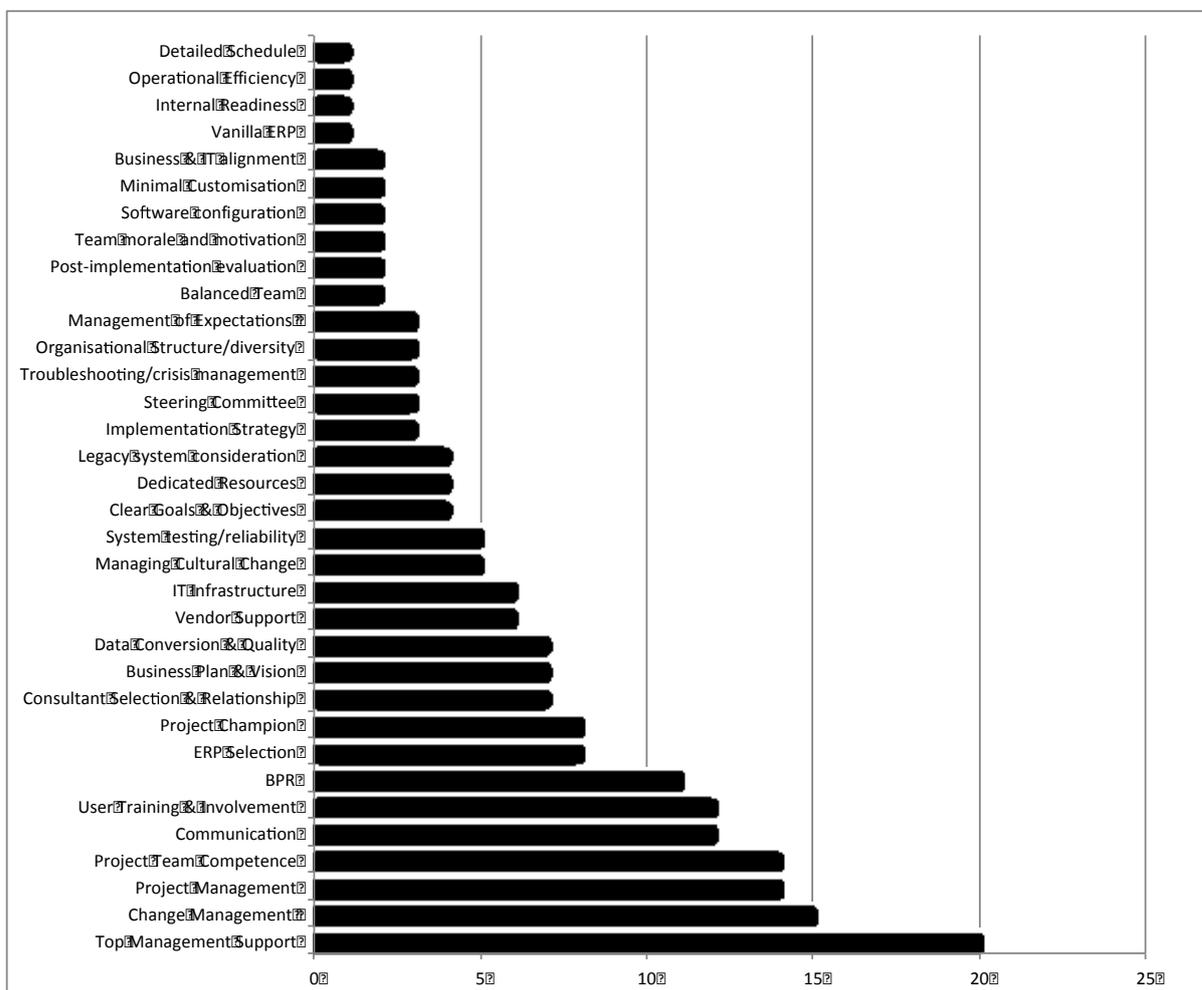


Fig.3-Critical Success Factor Rankings

*Top management support:* All 20 studies found top management support to be critical to the success of ES implementations (Soliman et al., 2001; Bradley, 2008; Doom et al., 2010). Sarker and Lee state that ‘ES implementations can only be successful if there is a strong and committed leadership guiding the initiative’ (2000: 218). Sumner notes that a ‘lack of senior management commitment and a lack of agreement on a set of project goals and objectives and aligning these with business objectives as reasons for project failure’ (1999: 318). Dong also notes that a lack of shared IS vision, shared understanding between senior business officers and senior IS officers about an IS innovation and its contributions to organisational competitive advantage (2001) as

three critical issues within top management support for IS innovations. Al-Mashari et al., sum up the importance of top management support stating, 'a review of successful ES implementations has shown that leadership and top management support are the most critical factors in organisations embarking on ES implementations' (2003:356).

*Change management:* Change management was cited across 15 studies as one of the most important critical success factors for the successful implementation of ESs (Umble et al., 2003; Finney & Corbett, 2007; Koh et al., 2011). Poor success rates with ES implementation are often attributed to the overly 'technical' focus applied to installation (Loonam & McDonagh, 2004). As Al-Mashari notes change management refers to all the human, social related and cultural change techniques required by management to ease the transition to and minimise organisational resistance for the new system (1999). According to Browne and Vessey pre-planned communications and training are vital considering the amount of organisational learning associated with the implementation of an ES implementation (2001).

*Project Management:* The study found 14 articles to cite Project Management as a key critical success factor for ES implementation (Akkermans & van Helden, 2002; Liu & Seddon, 2009). Kraemmergaard and Moller tend to see the role of project management as incorporating several CSF's stating that it involves effective project planning, effective change control, business justification and compatibility of skills with the skill set needed for project requirements (2000). Esteves and Pastor (2001) consider that proper management of scope is critical to clarify the goals and ensure that they run in tandem with the overall organisational mission and strategy, otherwise poor project management can result in greater costs, extended schedules, and the constant altering of the projects scope). Umble et al., (2003) also support a clear definition of project objectives in order to 'avoid the all too common 'scope creep' which can strain an ES budget, jeopardise project progress and complicate project implementation. Instead the project scope must be clearly defined at the outset and should identify the modules selected for implementation as well as the affected business processes'. Nah et al., (2001) found that the role of project management was to avoid schedule and budget overruns, forcing the project team to adhere to planned events and cost targets while delivering early measures of success to the organisation.

*Project team competence:* Project team competence was cited by 14 studies reviewed (Nah et al., 2001; Françoise et al., 2009). Davenport (1998) talks about how it is the goal of the ES project team to promote the project but also to transfer the skills and knowledge they have to other users throughout the organisation. Willcocks et al., (2000) believe that successful ES implementation requires a balanced multifunctional team that is composed of members with a variety of skills from different areas. The project team should have access to an individual who is a 'business analyst', possessing knowledge of the business and the technology. Wee (2000) notes that it is particularly important that the cross functional project team have a mix of consultants and internal staff that can develop the necessary technical skills for design and implementation therefore embedding these skills into the organisation.

*Communication:* The fifth critical success factor identified from the ES literature is communication (Nah & Delgado, 2006; Dezdar & Sulaman, 2009) cited by 12 of the 20 studies reviewed. Communication is essential within the project team and between the project team and the rest of the organisation or as Somers and Nelson stated 'communication is the oil that keeps everything working properly'. Sedera et al., further support the need for communication stating that 'structured communication and feedback....is one of the most important factors for success' (2001). Sumner (1999) notes that communication should cover the scope, objectives and tasks of the ES implementation project while Holland et al., state that communication should include the promotion of project teams and the advertisement of project progress to the rest of the organisation (1999). Finally, Al-Mashari et al., (2003) consider that the communication plan has to detail the rationale for the ES implementation, details of the business process management change, demonstration of applicable software modules, briefings of change management strategies and tactics and establishment of contact points.

*User training & Involvement:* This critical success factor was cited by 12 studies as being of importance for ensuring ES implementation success (Woo, 2007). Inadequate user training and the failure to understand how ES change the organisations business processes, frequently appears as a reason for implementation challenges and outright project failure. Bingi et al., believe that training employees is often a hidden cost during

project implementation with Volwer telling us that by reserving 10-15% of the budget for training, it gives the organisation an 80% chance of implementation success (1999). Similarly, Umble et al., state that 'training is probably one of the most widely recognised critical success factors because user understanding and buy-in is essential' (2003).

*Business process reengineering (BPR):* BPR was found to be critical to 11 studies reviewed in this study (Plant & Willcocks, 2007; Woo, 2007). An ES implementation must align the system with the organisational business processes in order to positively affect performance and seek greater standardisation of processes across the organisation. BPR, first championed by Hammer and Champy in the early 1990s, is a methodology that can support organisations in re-engineering or re-designing organisational business processes (1992). According to Hammer and Champy, BPR is defined as 'the fundamental re-thinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed' (1992). BPR allows organisations to align their business processes with the ES therefore customising the company's business process needs to the new system.

*ES Selection:* The selection of a system by implementing organisations is another critical factor cited by eight of the reviewed studies (Akkermans & van Heldon, 2002; Liu & Seddon, 2009). As ES typically have a manufacturing oriented background (Davenport, 1998), organisations must ensure that the choice of system will align with their respective culture and industry. Once a system is chosen and implementation occurs, inappropriate fit between the system and organisational culture will result in a costly separation at a later date (Loonam et al., 2013). Some public sector organisations have found it challenging to fit large manufacturing oriented software into their respective cultures (Chang et al., 2000). Organisations that do not consider selection thoroughly can end up adopting large-scale customisation of the software that escalates project implementation costs.

*Project champion:* This study reveals that eight of the 20 studies cited project champion as critical to successful ES implementation (Al-Mashari et al., 2003; Plant & Willcocks., 2007). The project champion often plays a fundamental role in change management

efforts throughout the implementation life-cycle. Sumner further suggests that the champion should be a business leader in order to offer the project a constant business perspective (1999). Davenport (1998) believes that the project champion should come from the business realm but have a strong grounding in technology; therefore they will be able to transfer their knowledge to all users and perhaps more importantly to top management and project investors.

*Consultant Selection & Relationship:* Finally, the tenth critical success factor cited by the studies under review is that of consultant selection and relationship management. In all, seven studies found this critical factor to be important to successful ES implementation (Finney & Corbett, 2007; Doom et al., 2010). Similar to choice of ES system, the selection of consultants is vital to effective project implementation. Consultants bring external expertise and knowledge that organisations require in order to implement a socio-technical project such as an ES. Managing the client-consultant relationship is also critical for implementing organisations. In particular, it is the responsibility of organisations to ensure they manage consultant's performance and contribution. As top management support is such a critical factor for these projects, ownership and leadership resides at the top and should not be outsourced to external partners.

## **Conclusions**

ES promise to seamlessly integrate business processes throughout the organisation. Yet significant challenges have arisen with the implementation of these systems. In particular, organisations often spend significant amounts of time, money, and energy on such implementation with little to show for it afterwards. This study makes a significant contribution to our understanding of the ES literature by focusing specifically on journals referenced in the Harzing Quality listing. Such a review provides a further perspective on understanding ES implementation. The review, specifically, reveals that one of the most important topics of discussion amongst scholars is the attainment of "success" from project implementation. A total of 768 journal articles cited in Harzing were compiled for study investigation. From this review, the authors identified 34 key

critical success factors that can now provide both scholars and practitioners with a more holistic view of ES success.

Such a list of empirically validated CSFs can now provide scholars with a framework upon which further research can be explored. From a practitioner perspective, this study will provide project champions with a clear and definitive set of factors that are critically important to implementation success. However, the study was curtailed by certain limitations. From an empirical perspective, the study provides a list of CSF and not a conceptual framework. To advance this study, future research will need to empirically validate the findings and build a framework to support scholars. Similarly, from a practical perspective, lists of CSF are limited in that they need to be effectively mapped to a particular “process” of implementation. Again, in supporting future research, scholarship should focus on mapping these CSFs in a specific process map to assist practitioners in successful ES implementation.

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