Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance?

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ABSTRACT

Frequent commentaries in the literature have stated that certain critical success factors (CSFs) have to be accomplished in an organisation for an enterprise resource planning (ERP) system project to be successful. In this study we argue and demonstrate empirically that success in implementing an ERP system and in gaining performance improvement should be conceptualised as two separate dependent variables. The distinction is made because the former aspect is based upon project delivery outcomes, while the latter assesses post-ERP project performance. We question whether some factors labelled as 'critical' success factors for ERP projects are in practice actually critical for achieving success in implementation and improving output performance. To examine this we report an empirical study that has investigated whether four major CSFs are in practice critical for achieving organisational performance improvements, and the role that successful implementation may play in influencing the relationship between CSFs and improvements in organisational performance. A conceptual model was devised and then analysed using structural equation modelling based on data collected from 217 organisations. We found that some CSFs were not critical to achieve success in ERP implementation but were critical to help an organisational achieve performance improvement from an ERP system. Additionally, we also found that achieving successful ERP system implementation mediates the degree to which a CSF affects output performance improvement. The managerial and research implications of these findings are discussed and the limitations of the study noted.

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1. Introduction

In the 1990s, enterprise resource planning (ERP) systems pioneered a process-oriented business management paradigm. ERP entails gaining knowledge of best business practices and applying these to improve or completely replace existing, legacy practices. The implementation projects of ERP in the 1990s and early 2000s faced challenges such as shortages of experienced project managers and consultants and limited vendor support capability. Today, experienced managers and consultants abound and vendor implementation support protocols are well developed.

However, despite this increased experience and capability, the changes required by ERP have often proven to be overwhelming in many organisations, resulting in ERP project failures (Maguire et al., 2010). The overall failures and implementation difficulties of ERP projects have attracted much research interest

(Liu and Seddon, 2009), which has resulted in the accumulation of a substantial body of literature that identifies a large number of CSFs for ERP implementation and overall project success.

However, the continued high failure rates of ERP projects remain a concern (Liu and Seddon, 2009). Table 1 gives a summary of recent ERP problems and failures as evidence of these concerns. This table is drawn from Kimberling (2011) and Ram et al. (2013a) and supports the need for further research to help reduce the failure levels. Several explanations for the continued failures have been proposed. For instance, some researchers suggest that the studies that have identified critical success factors (CSFs) for the implementation process have failed to provide an understanding of how these CSFs for this stage may influence the subsequent performance outcomes of an organisation (El Sawah et al., 2008; Liu and Seddon, 2009). Other scholars even question the usefulness of CSFs (Häkkinen and Hilmola, 2008; Liu and Seddon, 2009).

The current level of knowledge about the role and influence of CSFs and their effects on ERP implementation success and post-implementation performance outcomes is not well established (Finney and Corbett, 2007; Soja and Paliwoda-Pekosz, 2009).

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Table 1
List of ERP project problems/failures.

Organisation name	Year	ERP projects problems and failures
National Health Service (NHS) United Kingdom	2011	After spending about £12 billion (US$18.7 billion), NHS abandoned the project that was aimed at centralising electronic health records of its citizens.
CityTime Payroll System project, New York USA	2011	The project failed due to cost overruns, from budgeted $63 million to an estimated amount of $760 million, and a criminal probe.
Ingram Micro Australia	2011	The problem with SAP implementation at Ingram Micro led to a significant drop in its net income twice in year 2011.
Montclair State University, New Jersey USA	2011	PeopleSoft implementation at Montclair State University faced problems leading to University filing lawsuit against the Oracle for the botched implementation.
ParknPool, USA	2011	The furniture seller company sued Epicor over the failed ERP project.
Marin County, California, USA	2011	Marin County filed a lawsuit against Deloitte Consulting and SAP over a failed ERP project.
Whaley Foodservice Repairs, South Carolina, USA	2011	Epicor was sued by the commercial kitchens equipment company for a project which cost the company more than 5 times the original estimated amount of $190,000.
State of Idaho, USA	2011	Idaho state faced problems due to design defects and other issues that led various payment delays and faulty claims processing after installing a new system provided by Unisys. The state could suffer loss of millions of dollars due to the faulty Medicaid claims.
CareSource Management Group, USA	2011	The group halted the ERP project and sued Lawson that to pay damaged of $1.5million as the software it provided didn't delivered the expected results.
The Victorian Order of Nurses, Nova Scotia, Canada	2011	The implementation of SAP's Payroll system resulted in issuance of faulty paychecks to nurses for at least six months.
Lumber Liquidators	2010	Problems with SAP system were encountered.
Dillard's, Inc.	2010	JDA's i2 implementation failed to meet customer's expectations.
Ferazzoli Imports of New England	2009	Epicor's system did not meet the customer's expectations as promised.

Sources: Kimberling (2011), Ram et al., (2013a)

Grabski and Leech (2007) have shown that the complementarity effects of CSFs on ERP success are important, yet are not well researched. Karimi et al. (2007) have emphasised the need for a better understanding of the effects of CSFs for ERP implementation in order to help organisations plan and execute their ERP projects more successfully.

This study adopted the definition of a CSF as:

for any business, the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation. They are the few key areas where 'things must go right' for the business to flourish (Rockart, 1979, p. 85).

We argue that a proposed CSF should only be accepted as such when attending to it results in achievement of successful ERP implementation or achievement of improved organisational performance outcomes. We question whether some of the factors that have been identified in the literature as CSFs have been well enough established empirically as contributing to implementation success and/or performance outcome.

We argue that the commonly-used concept of implementation success is usually judged based upon the direct outcomes of the project delivery which includes such measures as completion on time, completion within budget, completion as expected and completion to user satisfaction. The more complete effect of the project should go further than success of project delivery, and hence an overall organisational performance construct is also introduced in this study to measure the post-implementation stage performance outcomes. The organisational performance could include improvements in the operational, financial and customer services dimensions and the creation or enhancement of various long term advantages for the organisation. Therefore, our study proposed the conceptualisation of ERP project success as two separate variables: an immediate 'implementation success' construct and an overall 'organisational performance' construct, with the former occurring first and, perhaps, having a direct affect on the later.

We emphasise that the implementation success and the organisational performance of an ERP system are two distinct concepts and hence should be measured as separate variables in any exercise to understand the effects of CSFs.

The above discussion gives rise to the research questions addressed in this study:

1. Which of some proposed CSFs for ERP implementation are also critical for achieving organisational performance?

2. For these CSFs, is the relationship between them and organisational performance mediated by implementation success?

The investigation of the above research questions is undertaken with the aim of extending knowledge on CSFs and their role in ERP implementation success and ERP output performance improvement. The findings of this study will help practitioners to focus on the salient CSFs for achieving successful outcomes for ERP system projects. To address the research questions we develop a conceptual model and then empirically examine the relationship between specifically chosen CSFs and (a) ERP system implementation success, and (b) organisational performance.

The paper is divided into seven sections. Section 2 presents a review of the literature on ERP implementation, the relationship of CSFs to performance, and the rationale for the selection of the CSFs examined in this study. The research hypotheses and associated conceptual model are developed in Section 3. We describe and detail the methodology that was adopted for the empirical stages of the study in Section 4. The results of the analyses are then presented in Section 5, while Section 6 discusses the findings of the study. Finally, the study's implications, limitations and the proposals for future research are presented in Section 7.

2. Literature review

Given the research questions set for our study, this literature review focuses on the implementation of ERP, post-implementation organisational performance outcomes and the CSFs said to be associated with achieving successful outcome of ERP projects.

2.1. Implementation and post-ERP implementation organisational performance

Borrowing from Cooper and Zmud's (1990) definition of information technology (IT) implementation, we define ERP implementation