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Competitive advantage from ERP projects: Examining the role of key implementation drivers

Jiwat Ram [a,*], Ming-Lu Wu [b], Roger Tagg [c]

[a] School of Computer and Information Science, University of South Australia, Australia
[b] Division of Business and Management, United International College, Beijing Normal University–Hong Kong Baptist University, China
[c] Formerly of School of Computer and Information Science, University of South Australia, Australia

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Abstract

In this study, we build a conceptual model, which draws upon *information systems implementation theory*, to investigate the relationship between critical success factors related to the implementation of ERP software and the goal of competitive advantage. We test this model with data from a survey of 217 Australian organisations, using structural equation modelling (SEM). We find that organisations can best achieve competitive advantage by carefully managing: a) training and education, and b) system integration activities. Perhaps unexpectedly, neither well-conducted business process re-engineering nor good project management necessarily lead to competitive advantage. We have extended prior knowledge by providing empirical evidence that some CSFs do influence competitive advantage but that others may not. The results confirm that overall project delivery outcomes can be improved by understanding the influence of factors on both project management performance and post-implementation performance. Some theoretical and managerial consequences of the study's findings and limitations are discussed.
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Keywords: Implementation; Competitive advantage; Enterprise resource planning (ERP); Structural equation modelling (SEM); Partial least squares (PLS); Critical success factors (CSFs); Project management; System integration; Training and education; Business process re-engineering (BPR)

1. Introduction

Organisational spending on enterprise resource planning (ERP) systems has surged in recent years and is expected to continue to grow in the wake of technological advancement in cloud computing and 'pay-as-you-go' solutions (Gartner, 2012). This growth is due mainly to the expected benefits and value promised by ERP systems in information capabilities and resources; intellectual capital through knowledge creation; and improvements in operational, managerial and strategic dimensions (Molla and Bhalla, 2006; Woo, 2007). Academic and trade literature demonstrates that implementation of ERP systems remains a complex exercise, often resulting in difficulties and failures (Kanaracus, 2012; Ram and Corkindale, 2014; Ram et al., 2013a). For example, *Avantor Performance Materials* sued *IBM* over SAP project failure, and the *US Air Force* abandoned their ERP implementation after spending $1 billion (Kanaracus, 2012). On the other hand, ERP implementation has often led to performance improvements for organisations, as well as other tangible and intangible benefits (Beheshti and Beheshti, 2010; Seddon, 2005).

The monolithic approach manifested through integrated, end-to-end business processes by ERP systems offers opportunities for improved decision-making, information-driven innovations and consistent data management. It offers a platform from which to reach out through seamless connectivity — to supply chain partners and business stakeholders at inter- and intra-organisational levels (Ganly and Montgomery, 2012). Such capabilities can help organisations achieve competencies 'that go far beyond operational efficiency', hopefully evolving into competitive differentiation (Lengnick-Hall et al., 2004, p.308).

* Corresponding author at: Entrepreneurship, Commercialisation & Innovation Centre (ECIC), 5.26, Nexus 10 Tower, North Terrace, The University of Adelaide, SA 5005 Australia. Tel.: +61 8 8313 2562; fax: +61 8 8313 7512.
E-mail address: jiwat.ram@adelaide.edu.au (J. Ram).

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A *resource based view* (RBV) suggests that developing a unique collection of tangible and intangible assets and resources – and managing the resultant evolving capabilities – can lead to competitive advantage (Beard and Sumner, 2004). That means organisations need to develop capabilities and competencies that are difficult for competitors to imitate. On the other hand, a motivation for introducing ERP is to achieve process standardisation and to bring operational commonality with other organisations. Such a commonality of work routines and practices poses challenges for organisations if they then wish to develop assets and capabilities that provide *differential advantage* and sustain that for long periods.

The literature is not unanimous as to whether or not ERP can lead to competitive advantage. Some authors (Laframboise and Reyes, 2005; Molla and Bhalla, 2006) argue that ERP *can* lead to competitive advantage — by helping organisations develop efficient supply chain capabilities, attain agility in product/services delivery, achieve flexibility and adaptability in responding to customer needs, and improve information management to support innovations. Other authors (e.g. Seddon, 2005) recognise that ERP can help in achieving profitability, but not necessarily competitive advantage.

The large capital investment required to introduce ERP systems means that the investment decision is based on a carefully crafted business case. The decision to invest and implement ERP has to be aligned to the strategic direction of an organisation. Given the far-reaching affects on the organisation's use of the system and its subsequent performance outcome, it is clear that the way implementation is carried out can facilitate or hinder the ultimate performance outcome — including the achievement of any competitive advantage. A successful implementation outcome could provide a necessary platform for development of differential capabilities (Laframboise and Reyes, 2005). However our current understanding of how the implementation process – and the factors considered critical to its success i.e. CSFs – actually influences the achievement of competitive advantage, remains limited.

Leidecker and Bruno (1984, p.24) define CSFs as 'those characteristics, conditions, or variables that when properly sustained, maintained, or managed can have a significant impact on the success of a firm competing in a particular industry.' Such a conceptualisation implies that CSFs play an important, which could be direct or indirect, role in achievement of the desired performance outcome. Various researchers (see for example, Byrd and Turner, 2001; Kearns and Lederer, 2003; Liu, 2011; Tian et al., 2010) have investigated a direct association between CSFs and the achievement of performance improvements and competitive advantage. Yet little knowledge exists on the role of CSFs for ERP in generation of competitive advantage.

We believe that a better understanding of the contributions of the ERP implementation CSFs will provide an opportunity to managers to devote their time, resources and leadership to areas that are established as to be contributing to performance outcome, which is particularly important as managers have limited resources at their disposal. It could also help managers in making better decisions in choosing CSFs from among a plethora of identified CSFs, as well as target and manage those CSFs as a priority that are empirically shown to be influencing achievement of competitive advantage. Understanding of the role of CSFs for ERP could be vital for managers to establish a platform and strategise for achieving competitive advantage. A number of authors (for example, Shi, 2011; Tharenou et al., 2007; Thomas and Mullaly, 2006) concur with this line of thinking and emphasise gaining a better understanding of the role of CSFs in achievement of competitive advantage. As stated earlier, however, little empirical evidence of the relationships between CSFs for ERP and achievement of competitive advantage appears in the literature. Our study, therefore, seeks to address this gap in knowledge.

Hence our primary research question is as follows:

> How important are certain implementation CSFs in influencing the achievement of competitive advantage from ERP projects?

We present a literature review in Section 2, and a theoretical underpinning of the study in Section 3. We then present our research hypotheses, methodology and data collection in Sections 4 and 5 respectively. The results, a discussion of findings, theoretical and managerial implications, limitations of the study and possible directions for further research are provided in Sections 6, 7 and 8. Our conclusions are summarised in Section 9.

2. Literature review

2.1. Competitive advantage from ERP systems

Investments in systems such as ERP are made with the goal of developing specific capabilities and assets, as well as managerial and technical competencies, to create value and opportunities for differential long-term benefits (Piccoli and Ives, 2005). Implementation of ERP systems can simply lead to direct operational benefits; or it can indirectly facilitate business growth by stimulating innovations and capacity building around the technology. This in turn can create value and opportunities for differential long-term benefits (Piccoli and Ives, 2005); and these could ultimately result in competitive advantage (Molla and Bhalla, 2006).

Understanding the sources and drivers of competitive advantage is important for building specific capabilities and competencies. Bhatt and Grover (2005, p.253) found that capabilities such as *IT business expertise* and *having an infrastructure of business partnerships* contribute to achievement of competitive advantage. Similarly, Molla and Bhalla (2006) concluded that factors such as being the pioneer, having explicit vision and clear communication, organisational learning, managerial coordination and overall commitment to the development of the system help organisations in converting the initial benefits of implementing ERP into achievement of competitive advantage.

Laframboise and Reyes (2005) and Holland et al. (1999) found that ERP can complement proprietary organisational resources and capabilities in achieving competitive advantage indirectly. Similarly, baseline ERP systems can be combined with bespoke solutions to create differential benefits (Holland et al., 1999). ERP systems can help organisations in achieving

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