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Beyond critical success factors: A dynamic model of enterprise system innovation

Stephen F. King*, Thomas F. Burgess

Leeds University Business School, University of Leeds, Leeds LS2 9JT, UK

Abstract

Enterprise systems (often referred to as enterprise resource planning (ERP) systems) can help organisations manage their key resources: money, staff, products, customers and suppliers, more effectively. Like many new technologies, ERP has been accompanied by vendor hype and stories of implementation failure. Work on critical success factors (CSFs) should encourage more appropriate implementation practice; however many CSF studies conclude with a list of factors but provide little further guidance. This paper presents a new model of ERP CSFs which draws upon existing work in IS innovation and on simulation ideas in order to better understand the relationships between CSFs and to encourage exploration of more appropriate implementation strategies.

Keywords: Enterprise systems; Enterprise resource planning, ERP; Critical success factors, CSFs

1. Introduction

The work presented here arose from concerns that the large and growing literature on critical success factors (CSFs) was not providing practitioners with the tools to enable more effective interventions in major systems implementations such as enterprise resource planning (ERP) and customer relationship management (CRM). Large-scale integrated systems are by definition complex and difficult to implement. The systems have the potential to ''join-up'' organisations both internally and externally (with suppliers, partners and customers) with the promise of more efficient communications and transactions. But many implementations of ERP and CRM have been criticised regarding the time, cost and disruption caused by implementation and the sometimes limited benefits once the systems become operational. In response to this, a number of studies have proposed CSFs, largely for the longer-established ERP technology, but latterly for the newer CRM too. Whilst such studies are welcome, providing a list of CSFs is only a partial aid to the practitioner struggling to understand the implications of their actions.

The work described in this paper addresses the next stage in improving understanding of large-scale information systems implementation in general, and ERP implementations in particular. Drawing on the long-established field of simulation, a new model for ERP innovation is presented and its implications discussed.

*Corresponding author. Tel.: +44 113 3434462; fax: +44 113 3434465.
E-mail address: sfk@lubs.leeds.ac.uk (S.F. King).

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2. Enterprise resource planning

Heizer and Render (2003) define an ERP system as: "an information system for identifying and planning the enterprise-wide resources needed to take, make, ship and account for customer orders" (p. 540). A complimentary definition is provided by Aladwani (2001): "… an integrated set of programs that provides support for core organizational activities such as manufacturing and logistics, finance and accounting, sales and marketing, and human resources". Heizer and Render identified three major advantages of ERP systems: firstly, that business processes are integrated and automated; secondly, that common data and business practices are shared throughout the organisation; thirdly, that information is generated in real time. Enterprise systems are designed to tackle the fragmentation of information in large organisations, acting as an integrative mechanism connecting diverse organisational units by shared data and software modules (Davenport, 1998; Hammer & Stanton, 1999). The ERP software market is led by the German software vendor SAP AG, with its flagship product R/3 supported by an increasing range of additional modules and functionality including CRM, business intelligence, advanced supply chain planning and industry-specific solutions. The implementation of ERP systems involves a significant commitment of time and money. Heizer and Render (2003) reported costs ranging from $300,000 to several hundred million dollars, depending on the size of the organisation. According to some software vendors, implementing organisations spend three to seven times the licence fee on implementation and related expenses (Heizer & Render, 2003; Scheer & Habermann, 2000). A survey by Forrester Research revealed that 54% of responding organisations took more than 2 years to implement ERP (Worthen, 2002). The often-reported problems during or after ERP implementation are easily blamed on complex technology. However, this is generally not the case, and a range of organisational and management issues have been identified as standing in the way of the "dream" of enterprise integration (Davenport, 1998). ERP implementation should be viewed as organisational transformation, not as a large IT project (Edmonson, Baker, & Cortese, 1997; Wood & Caldas, 2001) with a need to devote significant resources and energy to change management (Al-Mashari & Zairi, 2000; Bancroft, Seip, & Sprengel, 1998; Hilson, 2001).

3. Success and failure

ERP represents a major investment. But the failure rates are high, with Griffith, Zammuto, and Aiman-Smith (1999) reporting that three quarters of ERP projects were judged as unsuccessful by the implementing firms. Success and failure are well-established areas of study in the information systems literature. A number of generic IS success models have been developed and tested in recent years (Davis, 1989; DeLone & McLean, 1992; Rai, Lang, & Welker, 2002; Seddon, 1997). More specifically, ERP implementations have been the subject of a number of studies aiming to identify CSFs (Akkermans & van Helden, 2002; Holland & Light, 1999; Hong & Kim, 2002; Somers & Nelson, 2001). Somers and Nelson (2001) asked US executives to rank the ERP CSFs—producing the following "top 10" in terms of the mean score (from 1 = low to 5 = critical):

- Top management support 4.29
- Project team competence 4.20
- Interdepartmental co-operation 4.19
- Clear goals and objectives 4.15
- Project management 4.13
- Interdepartmental communication 4.09
- Management of expectations 4.06
- Project champion 4.03
- Vendor support 4.03
- Careful package selection 3.89

Alongside, and complementing the work on success factors, is the body of work on IS failure (Irani, Sharif, & Love, 2001; Keil, 1995; Lemon, Liebowitz, Burn, & Hackney, 2002; Lyytinen & Mathiassen, 1998; Lyytinen