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## Commodity or competitive advantage? Analysis of the ERP value paradox



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### ABSTRACT

A true e-business enabled firm needs the support from a well-tuned enterprise resource planning (ERP) system for providing real time data. However, many companies complain that after their huge investments in ERP systems, they found the ERP systems do not bring them new orders, new profits, or competitive advantage as ERP vendors claim. Academic studies also found mixed results regarding ERP's payoff. In line with resource based view (RBV), the study proposes an integrated model to shed light on the ERP value paradox. We try to answer "With what organizational resources and by building what firm specific capabilities, the investment in ERP systems may bring firms competitive advantage". Using a sample of 150 ERP and e-business adopters in the US, we found that (1) organizational resources such as managerial skills and organizational change management play a more important role than IT resources (ERP, e-Business technologies) in generating business integration capability. (2) However, neither IT resources nor organizational resources directly provide firms with competitive advantage. Instead, business integration capability built from the two resources plays a mediating role through which business achieves competitive advantage.

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### 1. Introduction

Enterprise resources planning (ERP) systems are large commercial software packages that digitalize business processes (Banker et al. 2006, Davenport 1998, Markus 2000). ERP systems codify and organize an enterprise's business data into an integrated database, and transform the data into useful information that supports business decisions (Norris et al. 2000). The ability to access information from various parts of an organization helps firms streamline their business processes and reduce inefficiencies (Swaminathan and Tayur 2003). A well-tuned ERP system is also a critical backend solution that supports frontend e-business functionalities (Norris et al. 2000). A true e-business, whose supply, production, logistics, and distribution networks all need to be digitally enabled with a tight linkage from raw materials to end customers (Kauffman and Walden 2001), needs a well-functioning ERP system to provide accurate information in real time. Without seamless internal processes and data provided by ERP systems, e-business may simply be flashy web pages with no real substance behind them (Norris et al. 2000). Many researchers have pointed out that while buzzwords like "B2B," "B2C," and just about anything preceded by an "e-" seem to have taken center stage, yet ironically, each of these new terms at its most basic level repre-

sents an extension of an ERP system to customers and suppliers (Jacobs and Bendoly 2003).

In theory, an integrated ERP system that allows information to transparently flow inside and outside an enterprise would benefit a firm's supply chain efficiency (Lee et al. 1997, Rai et al. 2006). ERP vendors, therefore, often claim that ERP systems can bring firms operational excellence and competitive advantage. However, in practice, it is often observed that while firms spend hundreds of millions of dollars implementing ERP systems, not all of them find the systems beneficial to their bottom line (Banker et al. 2006, Seddon et al. 2010). Some firms complain the expensive ERP systems do not result in new orders, increased profits, or competitive advantage as the vendors claim. Even worse, a few of firms experienced disastrous outcomes resulting from failed ERP implementations (Barker and Frolick 2003, Zhu et al. 2010). Academic studies also found mixed results regarding ERP's payoff. Some studies found that ERP system implementation has positive associations with firm performance, including better productivity (Aral et al. 2005, 2006; Hitt et al. 2002), greater shareholder returns (Ranganathan and Brown 2006), decreased lead-time (Cotteleer and Bendoly 2006), and improved information quality and coordination (Gattiker and Goodhue 2005), while others did not find similar evidence. For example, Poston and Grabki (2000) reported that ERP adoption has no association with firms' income changes. Hitt et al.'s (2002) study found that ERP adoption has a significant negative relationship with Return on Equity (ROE), while Aral et al. (2005, 2006) found that ERP implementation has no association

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with Return on Assets (ROA), ROE, and profit margin. Seddon (2005) argues that, although ERP may be critical to a firm's operation, it is an unlikely source of competitive advantage. He believes that ERP systems have become a commodity and the benefits gained from ERP systems are competed away in the long term. Thus, there is an ERP value paradox: Is ERP merely a commodity to firms' e-business operations or is it a resource that can bring firms competitive advantage?

In order to address the ERP value paradox, we draw from two streams of literature to ascertain what has been done in the area and build our knowledge foundation. The first stream is IT value literature that focuses on ERP systems. IT value literature provides evidence that the mere adoption of IT systems does not by itself guarantee competitive advantage. Rather, it requires complementary *organizational resources* to develop effective *capabilities* for competitive advantage (Wade and Hulland 2004). However, while the importance of building these resources/capabilities has become evident, the traditional IT business value literature that applies a production function approach does not clearly explain what these resources/capabilities are (Mata et al. 1995, Melville et al. 2004). Given this, we examined the Resource-Based View (RBV) which provides a framework for identifying valuable resources and capabilities and can be used to analyze whether IT resources (such as an ERP system) and organizational capabilities might be associated with competitive advantage (Barney 1991). RBV also proposes two rent-creation mechanisms—"resource picking" and "capability building"—that could guide us to understand how ERP and other resources can generate business value (Makodok 2001).

The purpose of this study, therefore, is to shed light on the ERP value paradox. In line with the Resource Based View, we propose an integrated model to investigate with what organizational resources and by building what firm-specific capabilities, the investment in ERP systems can generate competitive advantage. In our study based on RBV, it was found that business integration capability—built from ERP, e-Business technologies, and organizational resources—represents an important mechanism explaining how resources are picked, combined, and transformed into a differential competitive advantage. By building the firm-specific business integration capability, ERP systems will not be merely a commodity but will bring firms competitive advantage.

## 2. Theoretical background

In this section, we first review existing ERP studies that build our knowledge: (1) IT value literature that focuses on ERP systems and (2) critical success factors of ERP. We then draw from the Resource Based View (RBV) to develop a theoretical framework to examine ERP's effects on firm performance.

### 2.1. IT value literature focusing on ERP

One stream of existing research investigating ERP investments and firm performance basically follows the "IT value paradox" paradigm—use a production function to examine the relationships between IT investments and productivity (Aral et al. 2005, 2006; Hitt et al. 2002). The IT productivity research has produced mixed findings and contradictory results (see Dedrick et al. 2003, for a review) and, similarly, current ERP value studies also show inconsistent findings. For example, while ERP implementation has a positive relationship with productivity measures (value added) and market value (Tobin's  $q$ ) (Hitt et al. 2002), it has no effect on profitability measures (ROA, ROE, and profit margin) (Aral et al. 2005, 2006). Furthermore, while some studies found that ERP adoption was related to decreased lead-time (Cotteleer and Bendoly 2006), improved informa-

tion quality and coordination (Gattiker and Goodhue 2005), better process efficiency, effectiveness, and flexibility (Karimi et al. 2007a, b), others reported that ERP adoption has no association with firms' income changes (Poston and Grabki, 2000). Huge performance differences are often observed across ERP adopters, even for companies that operate in the same industry and use systems from the same vendor (Seddon et al. 2010). Trying to find reasons to explain the mixed findings, IS researchers have started to argue that the IT productivity function approach, despite its analytical rigor, does not include organizational and environmental factors, thereby overlooking the impact of firm-specific features that can shape the impact of IT on firm performance (Melville et al. 2004).

### 2.2. ERP critical success factors (CSF) literature

The second stream of current ERP literature examines ERP's critical success factors. This research aims to find key success factors that have enabled some firms to capture benefits from their ERP systems while others have abandoned their ERP systems due to failed implementation (Liang et al. 2007, Seddon et al. 2010, Stratman and Roth 2002). These types of studies focus on many factors that are theoretically important organizational aptitudes reflecting a competence in the use of information systems (O'Leary 2000, Umble et al. 2003). For instance, one of the first studies addressing ERP CSFs was carried out by Holland et al. (1999), which proposed a CSF model with strategic and tactical factors. Somers and Nelson (2001) then identified a list of 22 CSFs associated with ERP implementation. Among them, top management support, project team competence, interdepartmental cooperation, and clear goals and objectives, were found to be highly important. Nah et al. (2001) attempted to group related sub-factors to form 11 CSFs and showed that top management support, project champion, ERP teamwork, and change management were the most critical to successful implementation of ERP. Since numerous ERP CSF studies (Akkermans and Helden 2002, Nah et al. 2001, Nah and Dellgado 2006, Remus 2007, Umble et al. 2003) based on different samples and research settings have identified a variety of CSFs yet there is no general agreement, Finney and Corbett (2007) conducted a comprehensive literature review of 45 ERP CSF articles. They found that top management support, change management, business process reengineering (BPR) and software configuration, training, and project team are the most frequently cited CSFs in the literature, and concluded the five most cited CSFs are significantly more important than others. Similarly, through literature reviews, Ngai et al. (2008) and Françoise et al. (2009) identified 18 and 13 CSFs, respectively, and indicated that top management support, BPR, change management, and training were most frequently cited as critical factors.

However, while many of these studies used case analysis, descriptive analysis, or factor analysis to provide initial empirical scales to measure the theoretical constructs (Moohebat et al. 2011, Snider et al. 2009), few of them examined these constructs in a model to understand their impact on final firm performance. In other words, these organizational factors can be prerequisites for successful "installation" of information systems, but are not necessarily related to improvements in firm performance. Furthermore, none of the previous studies investigated the role of an ERP system linked with the organizational factors in an integrated model to examine the inter-relationships and their relative impact on business performance. Therefore, this study aims to address this gap with a focus on the Resource-Based View.

### 2.3. Resource-Based View (RBV)

A potential framework for augmenting the theoretical basis of IT value is the Resource-Based View of the firm, which combines

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