An Integrated Approach to Performance Evaluation of Enterprise Resource Planning (ERP) System Implementation

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ABSTRACT

In spite of the immense expenses related with enterprise resource planning (ERP) systems execution and use, its effect on organizational performance stays vague. The goal of this study was to empirically examine the impact of ERP implementation and use on the long-term performance of organizations. This research leverages three fundamental specifications for the examination of impacts as follows: performance ratios (ROA, ROE, ROI, ROS), labor productivity (production function), and stock market valuation (Tobin’s Q). This research used a total of six years of financial data from 47 organizations in Thailand that implement and use ERP system. The findings reveal that a post-adoption period of more than four years may be needed in order to observe a significant impact from ERP investments on organizational performance.

KEYWORDS

ERP Implementation, ERP System, IT Investment, Labor Productivity, Organizational Performance, Performance Ratios, Return on Investment, Tobin’s Q

INTRODUCTION

Organizations continue to invest substantial amounts of resources into implementing enterprise resource planning (ERP) systems since being introduced in the early 1990’s. Commercially available ERP systems consist of a collection of software modules that are connected by a centralized database management system, which when combined, support a firm’s informational needs (Gelbard & Carmeli, 2009; Kouki, Poulin, & Pellerin, 2010). Although module naming may vary, contemporary ERP systems have become standardized in the functionality delivered, especially in manufacturing. The range of possible operational functionality offered includes production planning, resource planning, material planning, product costing, and production metrics. Virtually all ERP system providers (e.g., SAP, Oracle, Microsoft) structure functional modules as a collection of related submodules, allowing implementers the possibility of using none, some, or all of the features. The goal of ERP implementation is to enhance organizational effectiveness and to produce operational improvements. ERP systems have been viewed by a number of researchers as effective information technology (IT) investments having the potential to optimize the contribution of profit maximization factors in organizations.

DOI: 10.4018/JECO.2019070101
Despite the huge costs associated with ERP systems implementation and use, empirical evidence supporting the view that investments in ERP systems enhance firm performance has been elusive. The academic research focusing on the relationship between ERP systems as large-scale enterprise-wide IT systems and firm performance produced mixed findings (Ahmed & Ayman, 2011; Dwivedi, Papazafeiropoulos & Esteves, 2009; Hunton, Lippincott, & Reck, 2003; Matolcsy, Booth, & Wieder, 2005; Nicolaou, 2004; Velcu, 2007). Some studies have indicated a positive impact from IT investments (Hitt & Brynjolfsson, 1996; Kudrya & Diwan, 2002). In contrast, other studies have shown a negative impact (Gelderman, 1998; Hu & Plant, 2001). The mechanisms through which ERP systems impact productivity and hence profitability, appear to remain least understood.

Ultimately, organizations invest in ERP system with the expectation of achieving tangible benefits such as cost, personnel or inventory reductions, improved productivity, error reduction, and reduced cycle times as well as intangible benefits such as standardization, transparency, easier access to information, improved decision-making and increased security. Even though ERP systems have been widely used for decades, there remains lack of research on the impact of ERP systems on organizational performance. The inconsistencies observed among various studies investigating the relationship between ERP investments and organizational performance have been attributed to variation in methods, measures used in the investigations and levels of analysis (Ahmed & Ayman, 2011; Annamalai & Ramayah, 2011; Edgair, Rajemi, & Nadarajan, 2015; Galy & Saucedo, 2014; Hwang & Min, 2013; Madapusi & D’Souza, 2012; Morris, 2011; Shen, Chen, & Wang, 2016; Tenhällä & Helkö, 2015). Some studies report a positive impact from ERP system implementation while other studies report a negative impact (Cao et al., 2013; Zhu, Li, Wang, & Chen, 2010). Researchers have utilized several measures to quantify the impact of ERP system as no single measure was found to be sufficient to capture the effects of ERP system.

Implementing ERP systems is a large and complex undertaking. Studies on the impact of ERP investments also indicate a two-to-five-year delay in seeing benefits and suggest measuring benefits after three years (Nicolaou, 2004; Poston & Grabski, 2001). Similar to the studies on the impact of IT investments, the contradictory outcomes from the studies on the impact of ERP investments can be attributed to methodology problems and dataset limitations. In order to assess more accurately the impact of ERP investments on organizations, it is also necessary to employ proper measures for various variables over a long period. How to evaluate the value of ERP systems to an organization becomes a critical issue, especially given the increasingly important role of ERP systems in today’s business world. Other questions include: How long does it take for ERP systems spending to lead to performance improvement? Answers to these questions can facilitate an understanding of the true value of ERP systems and help managers to reap the full benefits of such investments. The goal of this study, therefore, was to examine empirically the impact of ERP implementation and use on the long-term financial performance of organizations. The theory and the method are discussed and tested in the context of organizations in Thailand.

BACKGROUND AND HYPOTHESES DEVELOPMENT

ERP System

ERP systems utilize a common platform to combine information into a single data repository with the potential to increase efficiency, improve control and eliminate redundancies (Dezdar & Sulaiman, 2009). Many organizations have adopted ERP system in order to facilitate consolidation of information, integration of operations, regulatory compliance, retiring legacy systems and to support decision making (Grabski, Leech, & Schmidt, 2011). An ERP system, if implemented and used correctly, can provide significant benefit to an organization (Jones & Zound, 2006). The centralization of information and process controls allow organizations to make extensive strides towards better conforming their data. This centralization allows employees to quickly and easily communicate and collaborate across
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