

# The impact of enterprise systems on corporate performance: A study of ERP, SCM, and CRM system implementations

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## Abstract

This paper documents the effect of investments in Enterprise Resource Planning (ERP), Supply Chain Management (SCM), and Customer Relationship Management (CRM) systems on a firm's long-term stock price performance and profitability measures such as return on assets and return on sales. The results are based on a sample of 186 announcements of ERP implementations, 140 SCM implementations, and 80 CRM implementations. Our analysis of the financial benefits of these implementations yields mixed results. In the case of ERP systems, we observe some evidence of improvements in profitability but not in stock returns. The results for improvements in profitability are stronger in the case of early adopters of ERP systems. On average, adopters of SCM system experience positive stock returns as well as improvements in profitability. There is no evidence of improvements in stock returns or profitability for firms that have invested in CRM. Although our results are not uniformly positive across the different enterprise systems (ES), they are encouraging in the sense that despite the high implementation costs, we do not find persistent evidence of negative performance associated with ES investments. This should help alleviate the concerns that some have expressed about the viability of ES given the highly publicized implementation problems at some firms.

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## 1. Introduction

Enterprise systems (ES) represent an important technology investment option for operations managers, and have been acclaimed in the practitioner and academic literature for their potential to improve business performance (Akkermans et al., 1999; Davenport, 1998). For the purposes of this research, ES include

one or more of the following applications: Enterprise Resource Planning (ERP), Supply Chain Management (SCM), and/or Customer Relationship Management (CRM) systems. This paper documents the effect of investments in ERP, SCM, and CRM systems on long-run stock price and profitability performance. The results are based on an analysis of a sample of 186 announcements of ERP implementations, 140 SCM implementations, and 80 CRM implementations at publicly traded firms. Performance effects are examined over a five-year time period for ERP implementations and a four-year time period for SCM and CRM implementations. Performance effects are also examined for both the implementation and post-implementation periods.

Firms have invested heavily in ES. AMR Research estimates that investment in ES amounted to more than

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US\$ 38 billion in 2001 (Kraus and O'Brian, 2002). Forecasters predict continued high growth in the level of investments in ES (AMR, 2004), which makes quantifying the financial returns of these investments an important research issue. By estimating the long-run financial effects of investments in ES, we shed light on the value of these systems.

Given the level of ES investment, there is relatively little empirical research that links investments in ES to financial performance using objective financial performance data. While some researchers have examined the effect of investments in ERP systems on financial performance, research on the effect of SCM and CRM systems on financial performance is very limited or non-existent. Furthermore, as we discuss in our literature review (see Section 2), existing research on the effect of ES systems on financial performance is not as comprehensive and thorough as it could be in terms of the metrics used, the methodology used to estimate the performance effects, and the time periods covered. Our analysis provides more rigorous and complete evidence on the effect of ES system on performance.

The evidence in this paper also contributes to the literature on the effect of information technology (IT) investments on financial performance (see Dehning and Richardson, 2002 for a recent review of this literature). Most of these studies have primarily focused on the total level of IT spending by firms over several years and the impact of this spending on different financial performance metrics. Very few studies have attempted to examine the effects of specific type of IT investments on performance (Chatterjee et al., 2002). Therefore, even though we may know that at an aggregate level IT spending positively affects performance, our knowledge about how specific IT investments affect performance is limited. Such knowledge can be useful in capital budgeting and allocating decisions, and targeting investments to those applications that give the highest returns. Investments in ES systems require major commitments of capital and managerial resources, and it makes sense to carefully estimate the returns from these investments.

Section 2 critically reviews the previous research on ES systems and motivates the need for this study. Section 3 briefly reviews the rationale behind the belief that investments in ES will improve financial performance. The contribution of this paper is a rigorous validation of this premise. Section 4 describes the sample collection. Section 5 describes the methods used to estimate the long-run stock price and profitability effects of the sample firms. The empirical results are presented in Section 6. Section 7 discusses these results

in the context of theories on how firms develop competitive capabilities and develops suggestions for future research on the operational mechanisms by which ES systems can improve performance.

## 2. Review of existing literature on the relationship between ES systems and financial performance

In documenting the effect of ES, researchers have used objective performance data on stock returns and accounting metrics as well as performance data collected through surveys and experiments. With respect to stock returns, researchers have used event study methods to analyze the short-term stock market reaction to announcements of ERP implementation. Hayes et al. (2001) and Ranganathan and Samarah (2003) estimate the stock market reaction to ERP implementation announcements based on samples of 91 and 136, respectively. Although not directly related to ERP systems, Chatterjee et al. (2002) examine the stock market reaction to 112 infrastructural IT investment announcements about technologies that provide a platform for future business applications. These studies find statistically significant abnormal stock market returns ranging anywhere from 0.5% to 0.84%, indicating that the market reacts positively to IT investment announcements.

Using the efficient market theory one could argue that the stock market reaction documented by these studies is an unbiased estimate of the value of such investments. However, abnormal returns over short windows may not provide a complete assessment of the value of investment. Recent research has shown that the stock market partially anticipates many corporate announcements, and in other cases abnormal stock price performance is also observed subsequent to the announcement (see Fama, 1998 for a review of some of these studies). This suggests that to get a better idea of the value of ERP investments, one should estimate abnormal performance over a longer time period. This is particularly important for ES announcements given the complex nature of these investments, their relative uniqueness and newness, as well as the uncertainty associated with how the adoption and benefits of these systems will evolve over time.

There are a couple of academic papers that use publicly available data to examine the effect of ERP systems on accounting metrics. Based on a sample of 50 publicly traded firms that announced ERP adoption during 1993 and 1997 Poston and Grabski (2001) investigate the effect of ERP adoption on profitability.

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