

The efficient use of enterprise information for strategic advantage: A data envelopment analysis

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ABSTRACT

A majority of manufacturers make use of some form of enterprise systems (ES), yet on average, the financial impact of ES adoption is essentially neutral. We propose that in an ES environment of easy information access, competitive success depends, in part, on the policies regulating enterprise information use. To explore this proposition, we examine the efficient use of different types of enterprise information in the realization of strategic performance. Efficient firms will devote fewer resources to information use to achieve the same strategic performance as less efficient firms.

We employ data envelopment analysis (DEA) using data collected from Enterprise Resource Planning (ERP) system adopters at two different points in time in order to calculate a measure of efficient information use. This information efficiency metric is validated as a strong predictor of Compustat profitability. Additional analyses suggest that the most efficient users of information tend to emphasize information related to operational excellence. Regardless of information emphasis, however, efficient manufacturers – in contrast to their less efficient counterparts – were more likely to exhibit a better match between the most emphasized type of information and the corresponding dimension of strategic performance.

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1. Introduction

Today's managers rely more than ever before on management information systems to provide them with the business data needed to make critical decisions. The prevalence of enterprise systems – MetaGroup (2004) estimate that 400 of the Fortune 500 firms have adopted Enterprise Resource Planning (ERP) systems – has ensured that many managers have access to up-to-the-minute data

on all aspects of their enterprises. Yet the long-term financial performance of the average firm with an enterprise system is not greatly different from that of firms without such technological support (Hendricks et al., 2007).

We define an enterprise system as an integrated planning and resource management system that coordinates information across all enterprise functions. Thus, an enterprise system encompasses more than core ERP functionality. By 2002, some form of integrated supply chain management (SCM), customer relationship management (CRM), and product lifecycle management (PLM) functionality was common among enterprise system users either through in-house development or software upgrades from major ERP vendors such as SAP (Bendoly and Jacobs, 2005).

In this study, we posit that having access to a vast amount of managerial information (e.g., product development timelines, customer feedback, resource status, etc.)

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does not by itself provide a competitive advantage. Since managerial time is a finite resource, a performance frontier may place bounds on the total amount of information that can be readily accessed and utilized in making decisions (Schmenner and Swink, 1998; Vastag, 2000). Thus, using data envelopment analysis (DEA), we examine the ways in which the manufacturer places differential emphasis on the “use” of various types of enterprise information (as opposed to its mere availability) in the realization of its strategy impacts its performance. Our DEA approach allows us to measure the efficiency of information use, as we analyze data collected on enterprise information use by manufacturers, matched with strategic performance data collected from the same firms 3 years later. The resulting DEA efficiency metric is found to be a strong predictor of Compustat profitability, attesting to its managerial importance.

The next section develops our research hypotheses. Section 3 provides a description of our sample and the methods used to construct and verify the empirical measures employed in the study. Section 4 presents the analyses and results of our hypotheses tests. We conclude with a discussion of the theoretical and managerial implications of our results, study limitations, and suggestions for future research.

2. Hypothesis development

In this section we present the conceptual framework and definitions relevant to our research model and develop the logic behind the study hypotheses.

2.1. Definitions and conceptual framework

A key premise of this research is that different strategies call for the use of (or emphasis on) different types of information available from the enterprise system, and result in strategic performance along various dimensions. We define *emphasis on a particular type of enterprise information* as the allocation of finite managerial attention predominantly on a specific set of information (as made available through a manufacturer’s enterprise system). *Strategic performance* represents key performance indicators that define a manufacturer’s strategic effectiveness. Building on these two terms, we define *efficiency of*

information use as the efficiency with which strategic performance is realized through an emphasis on enterprise information. Efficient manufacturers spend fewer managerial resources on information use to achieve the same level of strategic performance as less efficient manufacturers.

We employ a common framework of competitive strategies to categorize different types of enterprise information use and strategic performance. Treacy and Wiersema (1993) specify three basic strategies, or what they refer to as *value disciplines*: operational excellence (e.g., McDonald’s), customer intimacy (e.g., Lowe’s), and product leadership (e.g., Intel). Market leaders, according to Treacy and Wiersema (1993), typically excel at one of these three value disciplines, and tend to meet industry standards in the other two. Manufacturers that pursue the first approach – operational excellence – strive for cost-effective, rapid, and reliable fulfillment of order requirements. With the customer intimacy value discipline, the emphasis shifts to the development of close customer relationships; manufacturers attempt to increasingly tailor products and services to fine-tuned market niches. Finally, product leadership captures the manufacturer’s ability to rapidly develop and deploy state-of-the-art products and corresponding services.

2.2. The efficient use of enterprise information and profitability

In the context of this research, information use is tightly coupled with the technology that provides access to such information. The technical limitations of the enterprise system – as well as resource constraints on managerial time devoted to information search (e.g., accessing, understanding, transforming, and consolidating the information) – place bounds on how effectively information use can be converted into strategic results (Bendoly and Cotteleer, 2008). In effect, a performance frontier develops that represents a variety of information-use policies that most aptly leverage the available enterprise information (Schmenner and Swink, 1998; Vastag, 2000).

Fig. 1 provides a representation of such a performance frontier. Points A, B and C represent efficient manufacturers that predominantly focus on operational excellence, customer intimacy, and product leadership information, respectively, to achieve relatively high levels of strategic

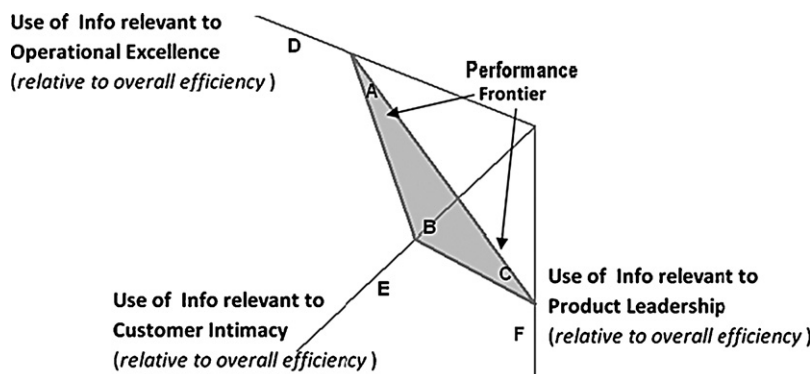


Fig. 1. The efficient use of enterprise information.

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