

Business technology complementarities: impacts of the presence and strategic timing of ERP on B2B e-commerce technology efficiencies

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Abstract

Enterprise resource planning (ERP) implementations have the potential of significantly complementing the use of business-to-business e-commerce technologies. We consider the sources of this complement by drawing on transaction cost economics, and the theory of swift even flow. Analysis of 115 firms shows that perceived transactional efficiencies are greater for B2B e-commerce technologies in the presence of ERP, and are in fact magnified when ERP implementation specifically precedes B2B e-commerce initiatives. These findings imply a distinct system adoption strategy for firms pursuing e-commerce opportunities.

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1. Introduction

Over the last decade, significant advances in information technology have provided the means for organizations to respond much more quickly to the actual state of market demand. The operational structure that organizations use in responding to market demand can effectively be broken into three components: inbound, internal and outbound logistics. From the perspective of internal logistics, developments in Materials Requirements Planning and Enterprise Resource Planning (ERP) systems have been prominent. Inbound logistics have been aided by the prospective use of inter-organizational technologies such as Electronic Data Interchange and more recently by emerging Business-to-Business (B2B) electronic commerce technologies. Certain outbound logistical activities have likewise been supported

by B2B electronic commerce technologies, allowing firms to introduce themselves to previously unassociated buyers. Although each of these technologies may be used independently of any of the others, it is possible that having more than one solution would provide more value to an organization than the value provided by each separately. This concept has been recently identified as one of the four major value drivers enhancing the value-creation potential of e-business, known as complementarities [1]. This study investigates the existence of complementarities between two specific technologies, ERP and B2B e-commerce.

In some cases, the functionality of B2B e-commerce technologies is built into ERP system packages marketed by firms. Examples of such reported capabilities can be found in evolving versions of systems developed by well-established ERP vendors including SAP, Oracle and Peoplesoft, which collectively represent more than half of the ERP vendor market by revenue. This portion of the market is also predominantly built upon the business of large multinational corporations. However, the remaining ERP market,

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characterized more and more by small to medium sized enterprise (SME) adopters facing a highly fragmented pool of developers, poses a decided contrast. A review of survey findings provided by the American Production and Inventory Control Society (APICS) shows that only 65% of these lesser-known packages are even partially equipped to handle purchase updates via the Internet or EDI, while only 43% are even partially equipped with e-Payment capabilities [2]. These numbers suggest that firms interested in such functionality need to rely on additional application vendors or in-house development efforts; an extremely costly proposition for most SMEs.

One of the primary goals of ERP implementations is to assure a seamless profile of internal enterprise processes [3]. Conversely, one of the primary goals of B2B e-commerce technology implementations is to make inter-organizational communication more efficient and cost effective. Since the effort of responding to market demand often involves both internal processes as well as communication between organizations in a supply chain, opportunities exist for coordinating and/or integrating these processes to achieve even greater benefits than are afforded by each technology independently.

With these ideas in mind, the present study draws on the theory of swift even flow, transaction cost economics and the concept of complementarities to consider how both the mere presence of ERP systems and the relative timing of system implementations can impact the efficiencies of B2B electronic commerce technologies. To assess hypothesized effects we analyze survey responses from firms representing both manufacturing and service operations. We show that the potential presence of ERP systems positively impacts future development-based transaction cost economies associated with B2B e-commerce technologies, while additional planning to ensure that ERP implementation precedes B2B e-commerce is backed by incentives associated with communication-based transaction cost savings.

2. Theoretical background

There is a growing belief that the ultimate benefits of ERP implementations appear only partially through short-term direct considerations, and largely lay in indirect impacts on longer term strategic plans [4]. ERP systems, a term coined by the Gartner Group, are not simply tools that provide singular outputs, but rather infrastructures that support the capabilities of all other information tools and processes utilized by a firm [5]. This has represented a significant deviation from the role of MRP packages, often contained within larger ERP systems, which have traditionally been viewed strictly as tools and not enterprise-wide transactional architectures themselves. ERP systems have further been distinguished by their touted “seamless integration of processes across func-

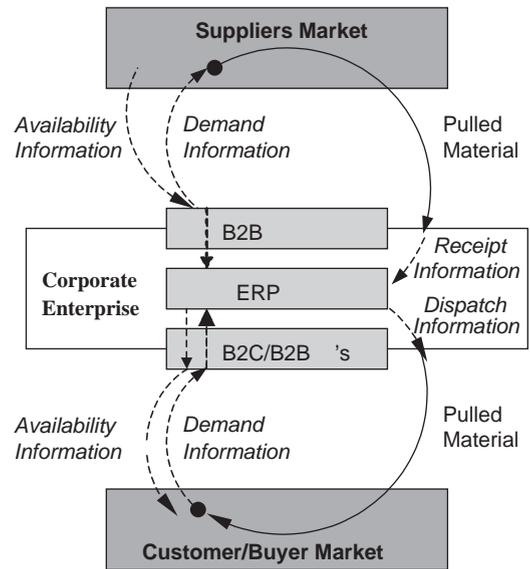


Fig. 1. Linkages provided by enterprise technology.

tional areas with improved workflow, standardization of various business practices, improved order management, accurate accounting of inventory and better supply chain management” [3]. Another common cited functionality of ERP systems has been that of the integration of information technologies relevant throughout the enterprise as well as among those extending beyond the enterprise [6–8]. Therefore the task of specifying or becoming familiar with the functionality of an ERP system implies the development of an understanding of both a firm’s internal and external capabilities.

The focused role of integrator that ERP systems have become synonymous with belies their developmental history. Originally, the concept of ERP emerged from inter-organizational, rather than intra-organizational interests [9]. This proving too difficult an initial task, early focus soon fell upon the development of internal enterprise oriented technologies. Only more recently has the inter-organizational focus reemerged, with the development of advanced integration-capable B2B e-commerce technologies. The integration of these advanced technologies to incorporate inbound and outbound data and analysis to already advanced internal enterprise systems promises to make possible many of the theoretical benefits of supply chain strategies. Fig. 1 illustrates the role of these technologies in strengthening vertical relationships.

Since the use of B2B e-commerce technologies can occur both with regards to upstream procurement and downstream sales activities, it is conceivable that the benefits perceived by alternate usage may differ markedly depending on a firm’s relative position in this framework.

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