

Chapter 13

Information Technology and Supply Chain Collaboration: Examining the Contingent Role of Environmental Uncertainty

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ABSTRACT

The utilization of advanced information technologies (IT) in interfirm collaboration has been thematic in current literature. Although conventional wisdom perceives that IT systems facilitate supply chain collaboration, this research provides an alternative perspective. Drawing on resource-based view and contingency 'fit' theory, the study investigates a model of relationships that specify how environmental uncertainty factors influence the nature of the association of two critical but distinctive IT capabilities with collaboration. Findings corroborate the positive association between collaboration and B2B e-commerce and IT analytic capability. However, demand unpredictability enhances the IT analytic capability-collaboration relationship while detracting from the B2B e-commerce-collaboration association. Notably, the study did not find any moderating influence of another critical uncertainty factor, technological turbulence. The findings reveal the complex nature of IT-collaboration relationships and provide managers a framework for understanding the uncertainty contexts under which specific information technologies with various functionalities may be more appropriately leveraged to derive benefits.

INTRODUCTION

The rapid growth of information technology (IT) use in current business practice has captured the imagination of practitioners and academia alike. The use of internet-enabled automated information systems that connect business activities across

firms, particularly, has changed the face of business. They have contributed to enhanced business performance (Rosenzweig, 2009; Sanders, 2007). The field of supply chain management (SCM) has especially benefited to such an extent that information technology defines the frontier of current SCM practice (Iyer et al., 2009). Advanced infor-

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mation technology applications have transformed SCM by enabling the widest ‘arc of integration’ among supply chain members and orchestrating streamlined value creation operations (Frohlich & Westbrook, 2001; Sanders, 2007). This paper distinguishes the internet-enabled systems that have considerably enhanced information-sharing, real-time dissemination of information and analytic decision-making among collaborative partners, from the more traditional information systems (e.g., traditional EDI, legacy based-information systems that aid basic transactions such as buy/sell, order entry and tracking). Not surprisingly, these advanced IT applications are considered an essential element, the backbone, of current SCM strategy, and thus are the focus of this research. References to information technology from this point on in the paper imply information technologies with advanced capabilities.

SCM is premised on collaboration, the coordinated coupling of processes across partner firms that integrates various facets of business flows. Collaboration engenders extensive cross-firm information sharing and elimination or reduction of non-value activities (Germain & Iyer, 2006). Collaboration among integrated supply chain partners requires extensive information-sharing and globally optimal decisions for staging the development and flow of products through the system, ultimately delivering value to end customers (Rai et al., 2006). IT capabilities provide functionalities such as forward visibility and real-time connectivity. This enables global optimization of resources, streamlined operations and synchronized supply chain flows in tightly coupled cross-firm processes (Sanders, 2007). Collaborative planning and replenishment processes, for example, depend on internet-enabled IT. Scheduling activities also need precise and timely actual usage or point of sales information. Thus, supply chain IT applications with their range of functionalities help partner firms exchange vast amounts of information for rapid decision-making and generating synergistic collaborative outcomes. By enabling development

of higher-order capabilities, advanced information technology applications have become essential elements of collaborative operations. They have established themselves as “powerful strategic weapons” for successful supply chains (Ke et al., 2009; Kent & Mentzer, 2003; Rai et al., 2006).

Despite the pervasive managerial view on the impact of information technology and eventual overall performance, the expected benefits from IT-enabled collaboration have materialized albeit inconsistently (Devaraj et al., 2007; Rosenzweig, 2009). Besides, academic literature has paid less attention to the direct facilitating role of information technology has in enhancing cross-firm collaboration (Sanders, 2007). A clear understanding of the IT-collaboration relationship becomes critical since collaboration is a mediating mechanism where the first order impact of information capability manifests, as evident in the following examples. AMR research (now part of Gartner) recently reported a “renaissance” in vendor-managed inventory (VMI)—a form of supply chain collaboration that came into prominence in the 1990s as a means of optimizing inventory levels throughout the distribution system. The driving force is the availability of information technologies that can leverage multiple sources of critical downstream data for collaborative forecasting, optimization of inventory levels, and better matching demand patterns with inventories in the system. Companies like Proctor & Gamble have seen numerous benefits including reduced inventory levels and obsolescence, and enhanced cash-to-cash cycles by deploying advanced information technologies in their collaborative relationships with downstream retail partners. In Dell’s case, internet-enabled technologies have created a superior supply chain. Dell has been able to extensively collaborate with supply chain partners—sharing and exchanging information, to provide end customers low-priced higher quality products. Information technologies have enabled Dell to forecast demand with high accuracy, and share updates with all key suppliers several times

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