The Digitization of an Aerospace Supply Network

Kevin Laframboise, Concordia University, Canada
Felipe Reyes, Concordia University, Canada

ABSTRACT

Unique, and certainly complex, networks of suppliers, clients, and operators (end users), characterize the supply chain in the aerospace manufacturing industry. With the emergence of e-commerce and enterprise information systems, a number of processes, locations, and partners can be linked globally—and in real time. Motivated by the need to achieve global integration, a Canadian aerospace manufacturer has embarked on a company-wide digitization initiative to integrate several members of its supply network. This pilot study illustrates how three separate business practices (i.e., process integration, supply chain management, and quality management) may relate to—and indeed reinforce—each other in this industry. Furthermore, this network-wide initiative can enhance new product development activities by integrating customer relationships management with collaborative design. From the perspective of the participating firm, we suggest that a truly global supply network needs to integrate several business practices in parallel in order to prosper as a digital extended enterprise.

Keywords: aerospace; ERP; information technology; supply chain; quality management

INTRODUCTION

Influenced by both organization theory and resource theories, the objective of this article is to suggest a framework for successful deployment of a quality-focused, Internet-based, digital supply-network integration initiative. The research on the effects of e-commerce in supply chain management (SCM), business initiatives such as enterprise resource planning (ERP), and quality management is growing, each research field evolving, in parallel. Despite this, little attention is given to these initiatives as synergistic activities. Organizations may not be sufficiently sensitive to the effects that one initiative might have on another initiative and although the literature is extensive on each of these areas separately, there is a lack of study on the synergy of the interrelation of these business practices. It is appropriate to examine ERP implementation, quality management practices, and the use of Internet communication as interrelated strategies.

Information Systems

Bhatt (2000), argued that although the link between information systems and business performance has been studied extensively, little research can be found regarding the synergistic
effects of information technology (IT) and other business initiatives such total quality management (TQM). Wagnera and Newell (2004) posited, “while software vendors recognize the industry context as influencing the appropriate ‘best’ practice design of an ERP system, they fail to acknowledge how the contextual specificity within an organization makes it difficult if not impossible to meet all users’ needs with a standard organizational solution” (p. 308). Additionally, IT investments have little impact unless they are accompanied by first-rate management practices (Dorgan & Dowdy, 2004).

Organizations may not be sufficiently aware of the effects that differences between what they expect and what the ERP vendor expects will have on the ERP implementation in the organization. According to Soh & Sia (2004), “extreme cases of package-organizational misalignment, has led to project and even organizational failure” (p. 375). In one of several examples, Girard and Farmer (1999) report that Foxmeyer (a bankrupt drug distribution firm) blamed their (well-known) consulting firm for a botched ERP implementation claiming the implementation disaster led to the bankruptcy.

Quality Management

Today, IT is critical to sustain competitive advantage in the marketplace and the presence of an existing quality program may facilitate new IT implementation (Soliman, Clegg, & Tantoush, 2001). Several companies with established quality programs have embarked on company-wide digitization initiatives (Snee & Hoerl, 2003). Nevertheless, despite such efforts, performance levels still need to be met. As Slater (2002) pointed out, “Until GM puts compelling vehicles on the market, all the digitization in the world won’t turn consumers’ heads.” Hence, integration efforts that accompany major ERP implementation and e-commerce applications can be supported by factors intrinsic to the firm (Weill, 2002b). These factors are not merely related to the IT infrastructure capabilities, but the established quality culture, a nurtured supplier base and technical competences might (all) facilitate ERP implementation. Collectively the partner members in a supply chain seek to gain advantage using a myriad of technologies, quality cultures, and competencies. However, while firms now compete on the basis of well-managed supply chains (Lancioni, 2000), Rahman (2003) described how the Internet, as a dynamic medium for channeling transactions, is challenging the traditional supply chain.

Internet Communication

The Internet can aid firms in almost any industry—and across the whole supply chain—to enhance operational effectiveness by improving the exchange of information between supply-chain partners in real time (Porter, 2001). For example, manufacturing firms that have followed a full-integration strategy (from suppliers to focal firm to clients) using e-commerce applications, have reported high levels of operational performance (Frohlich, 2002). With information received directly from the client, suppliers are able to synchronize production with their own suppliers. This synchronizing of information ultimately translates into a reduced bullwhip effect and improved supply-chain performance (Lee, Padbanaban, & Whang, 1997a 1997b). However, as Premkumar (2000) stated, “the withholding of information by even one member of the chain can lead to loss of trust and dysfunctional behavior among all members, despite the best technology to facilitate information” (p. 61). Accordingly, attention to detail and thoroughness in application of supply chain activities are de rigueur.

Integration

Wainwright and Waring (2004) call for more proactive approaches to developing models, tools and techniques regarding the implementation of integrated information systems. Accepting this challenge, in this article we attempt to answer the following question: How might interorganizational information systems mix with other business practices within, and between, firms? Using a pilot case study, we follow a single-firm, qualitative-research format
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