Chapter 76
An Empirical Investigation of Extensible Information Sharing in Supply Chains: Going Beyond Dyadic

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ABSTRACT

Although information sharing is highly desirable in a supply chain, the reality is that most supply chain participants restrict themselves to dyadic information sharing (i.e., information sharing between immediate, first-tier supply chain participants). In this investigation, data is collected from one system that permits extensible information sharing (i.e., information sharing beyond immediate, first-tier supply chain participants) to empirically investigate the determinants of extensible information sharing. The goal of this study is to identify specific actions that promote extensible information sharing. It uses hierarchical regression analysis to examine the contribution of these actions, after controlling for certain dyadic information sharing and industry practices. According to the results, companies that pursue real-time integration of the supply chain and are willing to change the roles and responsibilities of their employees engage in extensible information sharing. Surprisingly, it is found that companies that have a long-term relationship with immediate supply chain participants are less likely to expand their information sharing beyond dyadic information sharing, perhaps because of a perception that their information needs are adequately met.

DOI: 10.4018/978-1-5225-1837-2.ch076

INTRODUCTION

In modern supply chains, many companies are linked to their suppliers and customers through systems that enable information sharing. Information sharing spans all supply chain processes, including product design, demand planning, and replenishment planning (Nyaga et al., 2010). Information sharing makes it possible for supply chain participants to collaborate on important supply chain activities, including just-in-time manufacturing, vendor managed inventory (VMI), and continuous replenishment programs (CRP) (Danese, 2011).

Practitioners and researchers view information sharing as a means to counter the "bullwhip effect." The bullwhip effect is the amplification of orders as they move upstream in a supply chain. Even small changes in customer demand can ripple upstream, with each supply chain participant experiencing more order variability than the immediate downstream participant. Because supply and demand are out of sync, supply chain participants experience variability in inventories, resulting in oversupply, stock outs, and increased costs. To mitigate the problem, many companies are sharing data with their suppliers. An article in the *Wall Street Journal* (Aeppel, 2010) describes the efforts made by Caterpillar, Inc. to share with suppliers increases in the company's demand for materials and component parts, as the U.S. economy improves.

There is a considerable amount of research that suggests that information sharing in multi-tier supply chains (e.g., manufacturers, distributors, and retailers) mitigates the bullwhip effect and improves supply chain performance. This literature consists of analytical models that consider various supply chain structures, operational characteristics, and information sharing arrangements and describes the latter's positive impact on supply chain performance (e.g., Yu et al., 2001; Leng and Parlar, 2009).[1] Thus, it makes sense for companies to share information with various supply chain participants because extended information sharing improves supply chain performance (Croom et al., 2000; Frohlich & Westbrook, 2001).

Despite the research and demonstrated, favorable outcomes, most supply chains restrict themselves to dyadic information sharing, namely information sharing between companies and their immediate, first-tier upstream suppliers or downstream customers. The most prominent example of dyadic information sharing is Wal-Mart's Retail Link, which allows Wal-Mart to share sales and inventory data with a number of its immediate suppliers. Although researchers have investigated buyer-supplier-supplier triads, where suppliers are competing and collaborating with each other, while servicing the same buyer (e.g. Wu et al., 2010), this arrangement is still essentially dyadic. In fact, about 95% of supply chain integration initiatives are based on information sharing with immediate supply chain participants only, as companies generally lack the systems and/or the willingness to go beyond dyadic information sharing (Fawcett & Magnan, 2002). Concerning the latter, the benefits of information sharing may be tempered by the fact that the ensuing transparency and inter-dependencies may lead to opportunistic behavior by trading partners (Patnayakuni et al., 2006, Vandenbosch & Sapp, 2010). Thus, there may be opposing forces at play when supply chain participants increase the degree of information sharing in a supply chain.

Internet-enabled systems allow companies to increase the scale and scope of shared information to provide rich content and real-time data at lower costs (Liu et al., 2010; Prajogo & Olhager, 2012). Via information sharing, these systems can provide significant supply chain visibility and enable extensive connectivity and coordination (Benjamin and Wigand, 1995; Alt et al., 2000; Smits et al., 2006). However, the impact of internet-enabled systems is a function of the degree to which participants share information for their mutual benefit (Ferguson, 2000; Jharkharia & Shankar, 2005). If information sharing provides benefits to immediate supply chain participants, as discussed above, it should confer additional benefits