Drivers and outcomes of open-standard interorganizational information systems assimilation in high-technology supply chains

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A B S T R A C T

In recent years, firms in high-technology supply chains have established internet-based electronic linkages with their trading partners. As a result, they have improved their ability to coordinate and synchronize shared business processes by using more complete, accurate, and timely information. These electronic linkages are based on open-standard interorganizational information systems (OSIOS), which are fundamentally different from traditional electronic data interchanges. OSIOS capture not only the technical specifications for data interchange but also the sequential steps for the execution of shared business processes. Because OSIOS are still at an early diffusion stage, it remains unclear why firms would assimilate such an innovation and whether assimilation provides firms any benefits. In this research, we develop a framework grounded on the economics of standards, institutional theory, and strategic interorganizational information systems literatures to investigate the drivers and outcomes of OSIOS assimilation in a focused context. In order to test our hypotheses based on this framework, we used data from a high-technology supply chain and employed econometrical techniques. We found that both competition asymmetry across supply chain echelons and OSIOS assimilation within supply chain echelons predict individual firms’ OSIOS assimilation. The results also suggest that firms’ supply chain dominance is both a driver and an outcome of OSIOS assimilation, highlighting a mutually reinforcing process. In addition, our study reveals boundary conditions of the hypothesized relationships. The use of multiple theoretical perspectives, a unique dataset, and innovative statistical techniques to investigate OSIOS assimilation in high-technology supply chains contributes to the body of knowledge in both the supply chain management and management of information systems disciplines.

1. Introduction

Innovation assimilation – the overall process of invention, adoption, and deployment of new technology and related process improvements (Schumpeter, 1934) – is a key source of competitive advantage (Abernathy and Utterback, 1978). In high-technology supply chains characterized by networks of firms (Stuart, 2000), the locus of innovation assimilation lies in a wide array of interorganizational relationships (Oke and Idiagbon-Oke, 2010) that are beyond the purview of individual firms (Choi et al., 2001). In light of assertions that pressures in institutional environments influence competitive strategy (Dacin et al., 2002) and supply chain management (SCM) (Liu et al., 2010; Rogers et al., 2007), understanding the determinants and implications of innovation assimilation involving multiple trading partners in these supply chains is important for both theory and practice.

In this research, we investigate the emergent phenomenon of assimilation of open-standard interorganizational information systems (OSIOS) that integrate information technology (IT) with interorganizational business process standards (Bala and Venkatesh, 2007) in high-technology supply chains. Because the assimilation of OSIOS to support the integration of IT and interorganizational business standards in supply chains is a fairly recent phenomenon (Paulraj et al., 2012; Zhou and Benton, 2007), research has only identified a few initial drivers and benefits of OSIOS assimilation. According to prior studies, OSIOS contribute to an orderly sharing of information between firms (Zhou and Benton, 2007) by clearly defining the structure and format of electronic exchanges through a common language. Extant research has also underscored how OSIOS can support the choreography of these exchanges through a sequence of steps required to execute cross-boundary business processes between two or more firms (Zhu et al., 2006b). Thus, from an SCM perspective, research has depicted OSIOS as...

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OSIOS and their key differentiating attributes in SCM

OSIOS assimilation has critical implications for supply chain partnerships. Fuelled by the impact of the Internet’s open standards in business operations, the growth of OSIOS assimilation has the potential to transform how trading partners do business (Johnson and Whang, 2002; Mukhopadhyay and Kekre, 2002). The proliferation of internet-based IT, especially Extensible Markup Language (XML), has laid the foundation for firms to electronically share richer information with partners in their supply chains (Johnson and Whang, 2002; Swaminathan and Tayur, 2003). Such information sharing can promote efficiency (Rai et al., 2009; Saeed et al., 2005) by facilitating interorganizational collaboration and coordination (Balakrishnan and Geunes, 2004; Fawcett et al., 2011), joint knowledge creation and assimilation (Malhotra et al., 2005; Salamon and Martin, 2008), and mutual adaptation (Malhotra et al., 2007). Moreover, OSIOS can provide firms strategic flexibility to interconnect with multiple partners ( Gosain et al., 2004). In environments punctuated by rapid changes in demand, competition, and products (D’Aveni, 1994), these benefits can provide firms that assimilate OSIOS greater market power than other supply chain constituents (Riggins and Mukhopadhyay, 1994; Saeed et al., 2005). In contrast, the lack of common open standards for linkages using more traditional interorganizational information systems, such as electronic data interchange (EDI), has hindered interconnectivity and information sharing among firms (Frohlich, 2002; Gosain et al., 2003). Moreover, the closed nature of standards in these traditional systems has made it economically infeasible for groups of firms to promote a wider assimilation of these systems across industries. In order to support their efforts in assimilating OSIOS, firms have joined standard-setting consortia (Zhao et al., 2007), such as RosettaNet. OSIOS supported by these consortia are distinct...
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