The Evolution of Trust in Business-to-Business E-Commerce

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INTRODUCTION

E-commerce is defined as a means of conducting business electronically via online transactions among trading partners. Forrester Research predicted that B2B (business-to-business) e-commerce could be worth $5.7 trillion by the end of 2004. This study aims to examine the evolution of e-technologies and its impact on trust. Trust refers to reliance on and confidence in one's business partner (Mayer, Davis, & Schoorman, 1995). We discuss the evolution of e-technologies in light of the evolution of trust in technology trust (or transactional trust) and relationship trust or (relational trust). Electronic data interchange (EDI) was the prominent technology used in the 1970s and '80s. As we approached the 21st century and with the advent of the Internet, businesses feared that the lack of presence on the Internet would hinder their competitive and strategic advantages. Internet competition in most industries is forcing businesses to search for ways to improve product quality, customer service, and operation efficiency in supply chain management (SCM) in order to remain competitive. Today e-commerce has moved beyond EDI via value-added networks (VANs) by leveraging into the Internet and extending into Web technologies. The Internet is transforming and reshaping the nature of interorganizational commerce by enabling new types of interorganizational relationships. The business benefits include lower costs and more flexible systems that provide a facilitating structure for virtual relationships, enabling the easier identification of suppliers and products and more integrated supply chain management (Dai & Kaufmann, 2000). The Internet has impacted the SCM e-commerce environment by creating a centralized, global business and management strategy (e.g., make to order, assemble to order, and make to stock), and online real-time, distributed information processing to the desktop, thereby providing total supply-chain information visibility and the ability to manage information not only within firms, but also across firms and industries.

On the other hand, uncertainties, technical complexities, and concerns about trust have kept many firms from participating actively in B2B e-commerce. Uncertainties reduce the confidence both in the reliability of online B2B transactions and more importantly in the trading parties themselves. In a survey of 60 procurement trading partners involved in supply chain management at U.S. firms conducted by New York-based Jupiter Media Metrix Inc. in 2001, the findings indicated that 45% of the trading partners suggest a lack of trust prevented them from buying goods and trading online more frequently. In the next section we discuss the evolution of e-technologies, followed by its role in supply chain management and impact on trust.

THE EVOLUTION OF E-TECHNOLOGIES AND TRUST

We discuss the evolution of e-technologies from traditional EDI via VANs to Internet-based EDI, extranets, e-marketplaces, and Web services commonly used in supply-chain activities today. Further, we link these e-technologies and their impact on trust. The study provides a novel discussion on how management is affected by using e-technologies for SCM activities. More importantly, we discuss how the evolution of different types of e-technologies impacts the evolution of trust. The next section describes the e-technologies.

Traditional EDI via Value-Added Networks

The traditional EDI-via-VANs technology has been used for almost three decades and has brought its users significant advantages resulting in increased productivity and efficiency. EDI is defined as the computer-to-computer exchange of intercompany business documents and information through standard interfaces that requires hardware, software, and communications technology that permit computers to transfer the data electronically (such as purchase orders, invoices, shipping notices, and price lists).

Organizations that used EDI relied mostly on VANs and private messaging networks, both characterized by relatively high costs and limited connectivity. As an automated information exchange, EDI standardizes documents such as purchase orders, invoices, and shipping documents into an agreed-upon open-coded format. Con-

nectivity to VANs was available only for large organizations that relied mostly on mailbox services. VANs were considered too expensive to implement, and smaller suppliers were pressured to adopt EDI (Langfield-Smith & Greenwood, 1998). Furthermore, recent research reflects reluctance on the part of traditional EDI trading partners to adopt the Internet due to the newness of the Internet technology, potential Internet legislations, the lack of Internet standards, and the lack of reliability and security of data transmission within the Internet environment.

Internet-Based EDI

Alternatively, Internet-based EDI, with significantly fewer implementation constraints, plays an important role in extending EDI benefits to a wider spectrum of businesses. Internet-based EDI differs from traditional EDI as it uses proprietary flat files in HTML (hypertext markup language) formats and it establishes two types of connections. The first is a direct connection that requires front-end translation software to transmit and display documents or interfaces with existing in-house application systems. Second is through a third-party Internet VAN (IVAN) that sets up a Web page to perform translations and exchanges among trading partners.

What was once cost effective for only large corporations conducting e-commerce in EDI format is today feasible for all organizations through Internet commerce applications (using Internet-based EDI, intranets, extranets, e-marketplaces, and Web services). E-technologies promote accessibility, availability, and universality, thereby allowing trading partners to interact with one another easily. Furthermore, the Internet provides smaller suppliers with an easy, inexpensive method of accessing data in addition to providing a ubiquitous reach and real-time access to information.

Extranets

Extranets are Internet-based applications that use standard protocols, middleware, and browser software to fulfill functional requirements and support supply-chain operations. Extranets serve as information communication technologies that integrate internal and external communications along the supply chain. The applications improve firm competitiveness by increasing the efficiency of internal and external communications and organizations, and by facilitating new and improved products and services. Furthermore, it is used to support information sharing among registered trading partners. For example, when orders come into an extranet system, the lead time for delivering the products is composed of order-processing times, material lead times, assembly lead times, distribution lead times, transportation times, and installation times.

E-Marketplaces

White and Daniel (2003) describe e-marketplaces as Web-based systems that enable automated transactions, trading, or collaboration between business partners. An electronic marketplace is an interorganizational system that allows participating buyers and sellers to exchange information about processes, products, and services in the supply chain. Furthermore, Bakos (1998) suggests that the key tasks of e-marketplaces are matching buyers and sellers, aggregating and facilitating buyers' demands and sellers' products, and acting as agents of trust.

Web Services

Web services are modular Internet-based business functions that perform specific business tasks to facilitate business interactions within and beyond the organization. They are flexible, decentralized, open, unmonitored, shared Internet-based applications that allow firms to create new products and services faster than existing methods that consist of the dynamic assembly of loosely coupled components (e-services, legacy data; Fieldman, 2002; Fonseca, 2002). Web services bring requesters, providers, and brokers together, thereby connecting people, applications, and data (Fieldman). They are primarily technical, enabling e-collaborations among value-chain partners. Web services promise to increase flexibility, agility, and competitiveness as well as opportunities to reduce development cost and time. Early adopters of Web services include high-velocity industries, such as insurance, financial services, and high-technology industries. These industries are viewed as a set of diverse trading partners (including suppliers and customers) working closely together in a highly competitive market that requires continuous innovation to maintain competitive advantage (Paratech International, 2001). In the next section, we discuss how e-technologies impact supply chain management.

The Role of E-Technologies in Supply Chain Management

SCM is a network of facilities that procures raw materials, transforms them into intermediate subassemblies and final products, and then delivers the products to customers through a distribution system. The Internet provides a platform for electronic inventory management, production planning, purchasing, distribution management, and payment systems (Anderson & Lee, 2003). For example, in

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