

Traditional and Internet EDI Adoption Barriers

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INTRODUCTION

Electronic data interchange (EDI) is a conduit to innovative ways of conducting e-business processes, as well as facilitating e-business applications and services. EDI is the electronic exchange of business documents using standardized document formats (Blackstone & Cox, 2004). *Traditional EDI*, based on proprietary *value added networks (VANs)*, went through the early adoption stages in the 1990s (Clinkunbroomer, 1991; Premkumar, Ramamurthy, & Crum, 1997). Many factors caused the slow diffusion of the technology, including, but not limited to, high investment costs (Wilde, 1997), proprietary standards, poor integration capability with existing corporate systems, rigidity, poor scalability (Peters, 2000), poor performance in auditing trails, document certification needs, and the perceived need for hardcopies of the documents (Banerjee & Golhar, 1994). Despite these adoption obstacles, many large and small organizations have been leveraging the open architecture of the Internet to improve their agility and competitiveness. Unlike traditional EDI, *Internet EDI* adopts an open standard (extensive markup language or XML) and entails higher business agility by integrating the information systems of the business partners. Internet EDI is becoming an alternative to traditional EDI. Their natural differences pose an interesting, timely, relevant, and applicable research question: What would it take to accelerate the adoption of traditional and Internet EDI to support electronic business?

This article proposes a theoretical framework based on Rogers' (1983; 2004) *innovation diffusion model* and interorganizational theories. Major technological and managerial obstacles confronting widespread adoption of traditional EDI and Internet EDI are addressed. Future trends of these technologies are discussed as a conclusion.

BACKGROUND

Depending on the electronic means adopted, EDI can generally be classified as traditional EDI (connecting via proprietary VANs) and Internet EDI (connecting via the

Internet using open XML standards). *Small- and medium-sized enterprises (SMEs)* have been reluctant to adopt traditional EDI due to a lack of financial (Ahlin, 1991) and technical support (Banerjee & Golhar, 1994), as well as the constraints EDI places on business practices. The Bank of America, NASA, and Avex Electronics Inc. allied with Premenos to initiate the first Internet EDI project in 1995. This pioneer project's success accelerated the popularity of Internet EDI. Internet EDI is an anticipated alternative for SMEs from the perspectives of economics, operation (e.g., faster establishment of customer-supplier relationships) (Lehmann, 2002), and scheduling. Internet EDI allows business partners to conduct business over the Internet and saves money in purchasing and learning expensive software. Traditional and Internet EDI have natural differences in closed versus open standards, high vs. low cost, and business rigidity vs. flexibility. Expectations are that Internet EDI will be superior to traditional EDI at some point in the future, although the transition is inhibited by (1) the reliability and security of the technology, (2) unrealized benefits of the existing investment in traditional EDI, and (3) immature legislative regulation (Threlkel & Kavan, 1999). It is vital to understand their differences in technological and managerial barriers of adoption.

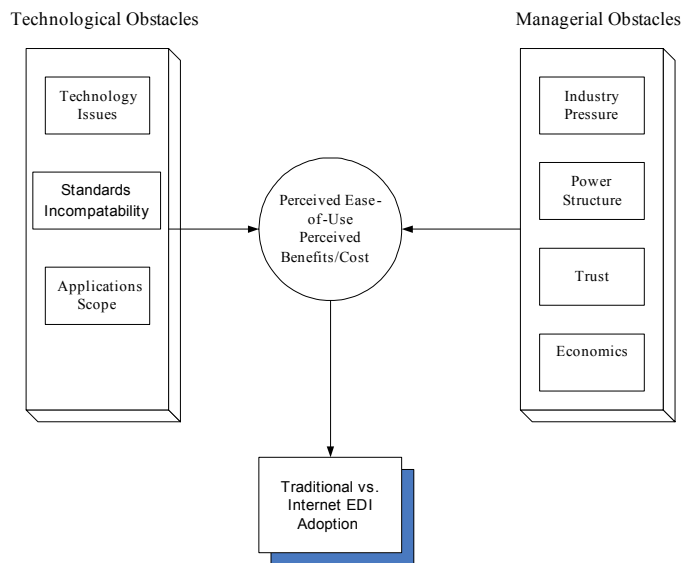
BARRIERS TO TRADITIONAL AND INTERNET EDI ADOPTION

Two major groups of obstacles present barriers for EDI reaching critical mass in its adoption curve: technological and managerial (Figure 1). Technological and managerial obstacles contribute to companies' perceived ease of use and perceived benefits/costs (Iacovou, Benbasat, & Dexter, 1995). These, in turn, impact traditional vs. Internet EDI adoption.

Technological Obstacles

Technological obstacles include technology issues, standards incompatibility, and application scope. Each is discussed in the following paragraphs.

Figure 1. A model to study EDI adoption issues



Technology Issues

The success of traditional EDI relies on the technological capability of dedicated, private or third-party proprietary VANs to interconnect heterogeneous systems and data communication *protocols*. Each company usually has unique ways to operate its business. Significant coordination and configuration efforts are imperative to reconcile the difference between trading partners. The installation of traditional EDI may also require changes in the existing business processes across different functions (Burrows, 1990). As a result, EDI adoption is usually susceptible to a sustainable and long learning curve. Technological barriers to the deployment of traditional EDI are even higher when supplier and customers use different VANs that do not have same coverage area or use incompatible technology. A Commonwealth of Australia report surveyed 227 respondents and found that “lack of EDI-capable business partners” (59%) and “integration of EDI with internal applications” (44%) are two major technological barriers to traditional EDI adoption.

Internet EDI needs to overcome different technological obstacles. The “hub-spokes” model of traditional EDI based on the coverage area of a service provider (Angeles, 2000) is no longer a relevant issue. Instead, suppliers and customers need to decide which e-marketplace or trading community they want to be associated with. Once a decision on a particular community is made, the supplier or customer will be connected instantly to larger buyers’ or suppliers’ base. One major shortcoming with the Internet

EDI is that data traffic on the Internet is less predictable. It is possible that Internet EDI slows or terminates during the transactional process due to the burst of data traffic. Therefore, Internet EDI is potentially weaker than traditional EDI in reliability and traceability. The mechanism for Internet Protocol security and networking management like Internet Engineering Task Force’s AS2 (Applicability Statement 2) security protocol must be in place to monitor, detect, and correct network security and congestion problems.

Standards Incompatibility

How do we handle data that can vary in data format, document architecture, syntax, data type, and templates that are customized for the backend applications of suppliers and customers? How far along the value chain and supply chain can a company go with a proprietary traditional EDI? Will traditional EDI interfere with existing backend applications? How long will it take to coordinate and configure common global standards to reach a customer’s suppliers? These are standards incompatibility issues. Figure 2 compares traditional and Internet EDI with respect to the Open Systems Interconnection (OSI) Reference Model.

Traditional EDI adopts the *EDIFACT* (Electronic Data Interchange For Administration, Commerce and Transport) or *ANSI X.12* (American National Standards Institute) protocols that map to the lowest three layers of the OSI reference model. These three layers are so strictly

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