Chapter IX

Using Simulation to Evaluate Electronic Data Interchange

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Abstract

Reluctance of organizations to invest in electronic data interchange (EDI, Internet based EDI, and XML/EDI) is largely due to their inability to assess the return on these investments. We identify prescriptive and evaluative methodologies for analyzing investment in EDI: non-financial methods, purely financial methods, and financial and strategic consideration methods. We also show how computer simulation can be used as a tool for assessing EDI. Evaluating the benefits resulting from EDI implementation were illustrated through the well-known Beer Game. Our analysis and review also identifies difficulties involved in assessing the benefits of EDI in supply chains.
Introduction

Electronic data interchange (EDI) is a form of electronic communication that allows firms to exchange transaction data and documents in structured formats that can be processed by computer applications software. EDI is described (Monczka & Carter, 1998) as the direct electronic transmission, computer to computer, of standard business forms between organizations. The ability of companies to compete and survive in a global market will depend on their ability to be flexible and to adapt to changing market needs. EDI is a tool that can help companies meet this challenge (Lankford & Johnson, 2000). It has been widely demonstrated that EDI enables organizations to redesign their processes significantly because of its three main capabilities: high speed, reliability, and ease of data capture (Hoogeweegan, Streng, & Wagenaar, 1998; Leonard & Davis, 2006). However, the traditional conduct of EDI using value-added networks (VANs) has set up enormous barriers to its widespread usage and acceptance (Angeles, 2000). High costs and technical limitation of EDI make it appropriately only for large firms. These barriers can be overcome by using Internet-based EDI or EDI/XML that enables to reduce costs, reduce delay in transmission and improve global accessibility (Angeles, 2000; Lu, Tsai, & Chou, 2001).

Despite these arguments, organizations are still reluctant to implement EDI unless they are forced to do so (Webster, 1995). One main reason is that companies do not know whether, and to what extent, they should invest in EDI. They are also unable to assess the return on these investments (Hoogeweegan et al., 1998). Thus assessing EDI properly is a critical element that affects the organizations’ decision in investing in EDI. As long as adequate assessment of the costs and benefits of EDI is not done, decision makers tend to give priority to other investment rather than EDI despite its benefits.

This chapter aims to categorize the benefits and barriers of EDI and alternative forms of EDI such as Internet-based EDI and XML/EDI, and provide the taxonomy of prescriptive and evaluative methods to assess the value of EDI. The evaluation criteria for adopting EDI are investigated based on theoretical and empirical reviews. We also show how the benefits of EDI can be quantified using simulation. This approach is illustrated with the well-known Beer Game Simulation. Suite of methodologies identified by us, along with the Beer Game as an illustrative simulation tool, provide decision makers powerful methods to assess EDI before making decision to invest in it.

Our chapter is organized as follows: in the next section, we provide an overview of EDI, Internet-based EDI, XML/EDI, and benefits and barriers to their implementation. In the third section, we classify and review various methodologies used for justifying investment in EDI. The fourth section shows how computer simulation
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