Chapter 5 Conclusion and Future Research

Abstract

This dissertation has researched various aspects of Electronic Data Interchange. The first task was to research the current status of EDI to determine why the diffusion rate for EDI has been low relative to other information technologies. Based on this research, a model was developed to provide a framework for additional research. A model, based on inventory theory, was developed to provide increased understanding of the economics of EDI. Finally, an alternative paradigm for EDI was developed and tested. Three research questions were addressed in this dissertation.

1. What is the current status of EDI?
2. Is there an economic model that can explain the low diffusion rate of EDI?,
3. Is there an alternative structure for EDI that could lead to increased adoption rates?

The remainder of this chapter summarizes the contributions developed in the dissertation

Summary of Contributions

Current Status of EDI

EDI has not experienced the high level of adoption that other information technologies such as the Internet, World Wide Web, or personal computers have. It appears that low EDI adoption rates are not caused by technical feasibility issues. Instead, the low rates are related to the limited relative advantage of EDI over paper-based systems and the high degree of complexity of implementing and maintaining an EDI system. We propose an economic model that shows that EDI benefits are a function of the level of EDI integration with a firm's information system, the particular inventory policy that a firm uses, and whether the initiating firm is a buyer or seller. In addition EDI adoption is retarded by the requirement to use formatting standards which increase the complexity and implementation costs of EDI. Until these problems are addressed, EDI will maintain its low adoption rate.

The Economics of EDI

Determining the financial benefits that will accrue to a firm which implements EDI is a problem for decision makers. We develop a more complete economic model of the benefits of EDI based on our findings in Chapter 2 The results of testing the model provide insight into the low adoption rate for EDI. Based on the model developed here, we find that EDI does significantly increase costs for both integrated and non-integrated EDI compared to paper-based systems. Integrated EDI provides significantly lower costs than non-integrated EDI. Our model shows that reduced inventory costs are the major component of savings from EDI for firms who adopt it while using a fixed order quantity inventory system. Reductions in error rates and transaction costs were both important factors of the EDI cost reductions for firms which used a variable order quantity system.

We performed a breakeven analysis which found that holding costs were more important than backorder costs in determining the number of suppliers that a buyer would need in order to recoup their investment in EDI. In
the case of a small firm, only two to four EDI capable suppliers were required to break even. For medium size firms, seven to seventeen suppliers were required, and for large firms six to thirteen suppliers were necessary.

**Alternative Design for EDI**

New information technologies enable alternative designs for EDI. The JEEDI system which we designed eliminates much of the complexity and costs of the current EDI paradigm. It uses the Java programming language, JDBC, ODBC, and the Internet to produce a compact and efficient system. Our analysis indicates that the JEEDI design reduces the costs of installing and maintaining EDI. This means that a firm needs fewer EDI capable suppliers to achieve breakeven. In addition, JEEDI is relatively simple to implement and the programming code could be easily modified to accommodate additional suppliers. This reduces the opportunity for firms to act opportunistically which should also lead to increased EDI adoption rates.

**Future Research**

The models that are developed and tested in this dissertation are buyer oriented. Similar research could be done for supplier-initiated environments. Suppliers will probably not be able to use coercive power like buyers do and instead may have to adopt a different strategy to get their customers to adopt EDI. This might include providing financial incentives to those buyers that adopt EDI. This will impact the economic benefit structure for both the seller and buyer which is another area of research.

Our review of the research literature indicates that many organizations adopt a non-integrated form of EDI. However, we have not found empirical research that directly investigates the levels of EDI integration and its relationship to a firm's benefits. A formal study of the level of integration would be useful to researchers and industry. In addition, it would be interesting to learn if firms change the level of integration over time.

EDI has the ability to greatly increase the flow and speed of information in a supply chain. Currently, it appears that much of the information flow is done through purchase orders. This is not a very efficient nor necessarily effective way to transmit information and it contributes to the bullwhip effect. How and when to utilize EDI to improve information flows should also be researched.

Finally, the impact of new information technologies like intelligent software agents on EDI needs to be researched. One could envision using intelligent agents to further reduce the complexity of EDI beyond what is developed in this work.

In conclusion, EDI and the entire electronic commerce area provide many research opportunities. The research topics will continue to increase as communications and information technology tools evolve with time.