Strategic and Operational Benefits of B2B Data Exchange Technologies in Supply Chain Management

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RESEARCH MOTIVATION

The diffusion of electronic media for b2b data exchange in supply chain management, especially electronic data interchange (EDI), has reached an advanced level among most large firms. But penetration of these technologies is still far away from a 100% usage level. In Europe, 39% of firms exchange data electronically by means of standardized formats, a total of 23% applies EDI standards (Berlecon Research 2004). On a global scale, 95% of the Fortune 1000 companies used EDI a few years ago, but only 5% of smaller companies were EDI users (Kottok and Webber 2001). Consequently, it is highly probable that a firm that uses EDI cannot apply EDI for all its transactions and therefore uses several technologies for b2b data exchange. As a consequence, the efficiency advantages and benefits that are related to EDI and Web-based data exchange are not exploited for a firm’s total transactions. It is possible, however, that a firm’s optimal EDI penetration is less than 100% due to related costs and strategic reasons.

The research in progress at hand addresses the problem of multiple technologies in b2b data exchange. By today, there is little knowledge both in IS research as well as in supply chain management and logistics research concerning the question of costs and benefits of different data exchange technologies used within a single firm. In order to gain insights into the nature of performance of data exchange technologies, a research framework is developed that will be empirically tested by means of real-life data of a cooperating retailer. The firm belongs to the top three Austrian food retailers and pioneers in application of retail technology and electronic business tools. It is also a very active member of the national Efficient Consumer Response (ECR) initiative. This active role in ECR does favor the retailer’s interest in b2b collaboration and related EDI support but it can also contribute to specific benefits for the retailer.

THEORETICAL BACKGROUND

In IS research, much effort has been done in order to evaluate EDI costs and benefits in different theoretical contexts. EDI benefits have been analyzed on the basis of Transaction Costs Economics (TCE) (Mukhopadhyay and Kekre 2002), the Resource-Based View of the Firm (RBV) (Melville et al. 2004, Dyer and Singh 1998), the Embeddedness Theory (Chatfield and Yetton 2000), and Power Theory (Hart and Saunders 1998). Mukhopadhyay and Kekre (2002) stress the institutional perspective of EDI benefits and argue that a decisive influencing factor of EDI payoffs is a firm’s role as EDI initiator or EDI adopter. Additionally, a firm’s position within the supply chain, i.e. whether a firm is a supplier or a customer, has been identified as an antecedent of EDI payoffs. Based on these categorizations, we identify studies about firm’s role as EDI initiator or EDI adopter.

DEVELOPMENT OF THE RESEARCH MODEL

The basic assumption that inter-organizational information systems (IOS) contribute to an increase in benefits complies with all theoretical approaches mentioned above. One major issue is the decrease in transaction and communication costs that can be achieved by IOS application.

The theory of TCE (Williamson 1975) argues that a decrease in transaction costs favors the adoption of governance mechanisms that are closer to hierarchies than traditional relationships without IOS. Hierarchies are characterized by tight connection and a high level of independence between the engaged organizations whereas market-based governance is dominated by loose and short-term interactions. EDI cannot apply EDI for all its transactions and therefore uses several technologies for b2b data exchange. As a consequence, the efficiency advantages and benefits that are related to EDI and Web-based data exchange are not exploited for a firm’s total transactions. It is possible, however, that a firm’s optimal EDI penetration is less than 100% due to related costs and strategic reasons.

The theory of embeddedness goes into a similar direction as it argues that close interfir relationships are characterized by a high degree of trust, joint problem-solving, and exchange of information (Uzzi 1997). The theory of TCE (Williamson 1975) argues that a decrease in transaction costs favors the adoption of governance mechanisms that are closer to hierarchies than traditional relationships without IOS. Hierarchies are characterized by tight connection and a high level of independence between the engaged organizations whereas market-based governance is dominated by loose and short-term interactions. EDI cannot apply EDI for all its transactions and therefore uses several technologies for b2b data exchange. As a consequence, the efficiency advantages and benefits that are related to EDI and Web-based data exchange are not exploited for a firm’s total transactions. It is possible, however, that a firm’s optimal EDI penetration is less than 100% due to related costs and strategic reasons.

In a first instance, it is hard to apply IOS and their benefits to the findings of RBV (Barney 1991) as it is in contradiction to the implications of interfir relationships that deploy resources jointly. In its original form, the RBV focuses on one single firm’s resources and stresses factors that make these resources not accessible to other firms. If, however, RBV is adapted to issues of interfir relationships, as suggested by Dyer and Singh (1998) and Dovev (2002), strategic and operative benefits of commonly shared resources, such as IOS, can be explained by RBV.

Bases on the above-mentioned considerations, the study investigates strategic and operational payoffs of EDI compared to other electronic and non-electronic b2b communication media. The following research questions are defined:

- To what extent does operational benefit of b2b data exchange differ across various b2b data exchange technologies?
- To what extent do supplier’s attributes, characteristics of b2b data exchange technologies, and the type of transaction influence a technology’s strategic and operational benefit for a retailer?

Operational and strategic benefits are conceptually different constructs. Mukhopadhyay and Kekre (2002). For this reason, both focal variables are investigated. Influencing factors identified by literature research are transaction characteristics (derived from the considerations by Mukhopadhyay and Kekre (2002), the involved technology for b2b data exchange (derived from Chatfield and Yetton 2000 and Mukhopadhyay and Kekre (2002)), and supplier characteristics. All drivers and their measurement items are depicted in Figure 1. Strategic benefits are characterized by long-term and relation-specific properties that potentially alter processes and therefore improve
Figure 1. Research model on B2B data exchange technology performance

3. Process observation in order to measure the operational benefits of the communication media.

A total of approximately 200 suppliers within several product categories in different stages of EDI adoption will be examined. Transaction analysis will cover 5,000 transactions from a period of several weeks.

IMPLICATIONS AND EXPECTED CONTRIBUTION

For firms, an estimation of costs caused by various b2b communication media is an important information as it can be used for decisions concerning an appropriate medium. Payoffs achieved by different data exchange technologies may differ across product categories or even individual suppliers. The study results should not only be complementary to the widely investigated field of EDI benefits and therefore help to get a better understanding of key drivers of EDI and other technologies’ performance. An important goal of the study is developing recommendations for retailers concerning the choice of appropriate b2b data exchange technologies. Further research perspectives could focus on benefits achieved by lower inventory costs using economic order quantity modeling.

REFERENCES


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