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December 2004

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Koch, Hope, "Business to Business Electronic Marketplace Characteristics Driving Use" (2004). *AMCIS 2004 Proceedings*. 294.
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Business-to-Business Electronic Marketplace Characteristics Driving Use

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ABSTRACT

Of the array of electronic commerce business models, business-to-business (B2B) electronic marketplaces (e-marketplaces) have been one of the most heralded. These marketplaces bring together businesses buying and selling goods and services in an online buying community. E-marketplaces promise to increase the efficiency and effectiveness of procurement activities by replacing traditional manual processes with automated electronic procedures and by expanding the number of available trading partners. Despite the technology availability and the high potential benefits, very few e-marketplaces have succeeded. This three-year qualitative study investigates a major B2B e-marketplace stumbling block: achieving e-marketplace use.

This investigation develops a model of B2B e-marketplace characteristics driving marketplace use. This study offers insights to practitioners forming and participating in e-marketplaces. This study informs the interorganizational information systems literature as well as innovation diffusion theory, transaction cost economics, and the electronic markets hypothesis.

Keywords: business model, electronic procurement, electronic commerce, use, success, electronic marketplace

INTRODUCTION

Business-to-business (B2B) electronic marketplaces (e-marketplaces) are one type of business model for the digital economy. These e-marketplaces promise increased industry efficiency and cost savings by replacing limited physical buyer-seller relationships with an electronic buying community bringing together multiple organizations buying and selling goods and services. In 2001, reports estimated that B2B e-marketplaces would result in 30% annual cost savings (Tumolo, 2001) reaching \$1 trillion by 2010 (Memishi, 2001). Despite these early expectations, most B2B e-marketplace have not delivered these benefits. One survey indicated that 50% of companies felt their B2B e-marketplaces were not or mostly not meeting their expectations (Clark, 2001). Creating a B2B e-marketplace that participant organizations will use is a major problem. Based on a three-year qualitative investigation, this paper posits several B2B e-marketplace characteristics driving e-marketplace use.

PRIOR RESEARCH

This research did not follow a top-down method, first developing a conceptual scheme and then conducting fieldwork to confirm its value. The reviewed research developed as an emergent process during the longitudinal fieldwork. The paragraphs below provide an overview of the existing interorganizational information systems research. As suggested in Eisenhardt (Eisenhardt, 1989), the implications section compares this study's findings with existing IOIS research and underpinning theories.

Because the B2B e-marketplace research has yet to investigate e-marketplace characteristics driving e-marketplace use, the literature review expanded to include the IOIS literature. Cash and Konsynski (Cash and Konsynski, 1985) define an IOIS as a computer and communication infrastructure crossing company boundaries and enabling information sharing. Using this definition, a B2B e-marketplace is a type of IOIS. B2B e-marketplaces differ from most IOIS such as electronic data interchange (EDI) since e-marketplace require a critical mass of buyers and sellers participate.

Most of the B2B e-marketplace research (Bailey and Pearson, 1983; Bailey and Bakos, 1997; Bakos, 1991) investigates the impacts predicted by Malone, Yates and Benjamin (1987) electronic markets hypothesis. A limited number of studies investigate factors facilitating e-marketplace adoption and use. Of these studies, most (Choudhury, Hartzel and Konsynski, 1998; Dai and Kauffman, 2000; Lee and Clark, 1996) investigate factors facilitating B2B e-marketplace implementation decisions. Grewal, Corner and Mehta (2001) investigate firm e-marketplace participation. The study finds electronic market

participation depends on organizational motivation and ability. The study finds that firms that believe they have reengineered their business process to function effectively with an electronic market, emphasize efficiency motives, emphasize information technology capabilities, and deemphasize legitimacy motives.

METHOD

The first phase of the fieldwork began in August 2000 and spanned until January 2002. This phase included the “dot.com” boom and the “dot.com” bust. This phase included sixteen field visits comprised of unstructured interviews, participant observation, and document reviews of four organizations involved in B2B e-marketplaces. We prepared typed transcripts using thick description detailing each field visit. An initial coding of these field notes revealed B2B e-marketplaces were struggling to achieve use.

We designed further data collection to investigate B2B e-marketplace characteristics driving e-marketplace use. We developed and pilot tested an interview guide. We then solicited information from four marketplaces. Each with contrasting use levels. Within each e-marketplace, the research design involved soliciting information from: a high seller, a low seller, a high buyer, a low buyer, and a nonparticipant. This theoretical sample of marketplaces and participant organizations, with contrasting use levels, allows a comparison of e-marketplace use drivers by use level. This phase of the research spanned from May 2002 until May 2003 and included thirty-seven field visits. We collected 486 pages of single-spaced field notes.

We used line-by-line coding (Charmaz, 1983) as advocated in grounded theory (Charmaz, 1983; Eisenhardt, 1989; Strauss and Corbin, 1998) to analyze the field notes. This involved analyzing each case (within-case analysis) and then comparing each case (cross-case analysis). Within case analysis involved creating case reports summarizing participant responses to interview questions. Cross-case analysis involved classifying each e-marketplace as high or low use and each participant as high, low, or non-use. We then reviewed each line of the field notes and coded excerpts discussing B2B e-marketplace use facilitators or inhibitors into categories. We reviewed the text in each category by e-marketplace use level. This resulted in several drivers of B2B e-marketplace use.

FINDINGS

Based on the fieldnote analysis, Figure 1 shows B2B e-marketplace characteristics driving use. The model illustrates perceived relative advantage drives e-marketplace use. The model further posits that investor commitment and support drive perceived relative advantage and e-marketplace use. The two-sided arrow between perceived relative advantage and e-marketplace use illustrates that the more an e-marketplace is used, the higher the marketplace’s perceived relative advantage. Customizing to existing industry practices, supporting low-leverage procurements, fee structures, and benefits drive perceived relative advantage, which then drives e-marketplace use.

Table 1 compares the four e-marketplaces’ use levels and characteristics driving use. This paper disguises all company names. Use is measured by frequency and volume of transactions executed via the e-marketplace. Table 1 shows National Trucking Exchange (NTX) has the highest use level, followed by Pegasus, C-Store Exchange (CSX), and Retail Matrix.

While we would like to compare transaction volume across all four e-marketplaces, Gulf Coast Oil Corporation only used CSX for communicating pricing and store operation information with 3,500 Gulf Coast Oil stores. We include Retail Matrix in the table. However, most of Retail Matrix’s e-marketplace characteristic drivers do not add to this discussion since Retail Matrix was unable to attract any members to conduct business over its e-marketplace before closing. As such, most of the cell entries for Retail Matrix are not applicable. Unavailable appears in a few of the table’s cells. This indicates that the field notes did not provide information for a particular driver in a particular e-marketplace.

The paragraphs below discuss each driver in Figure 1.

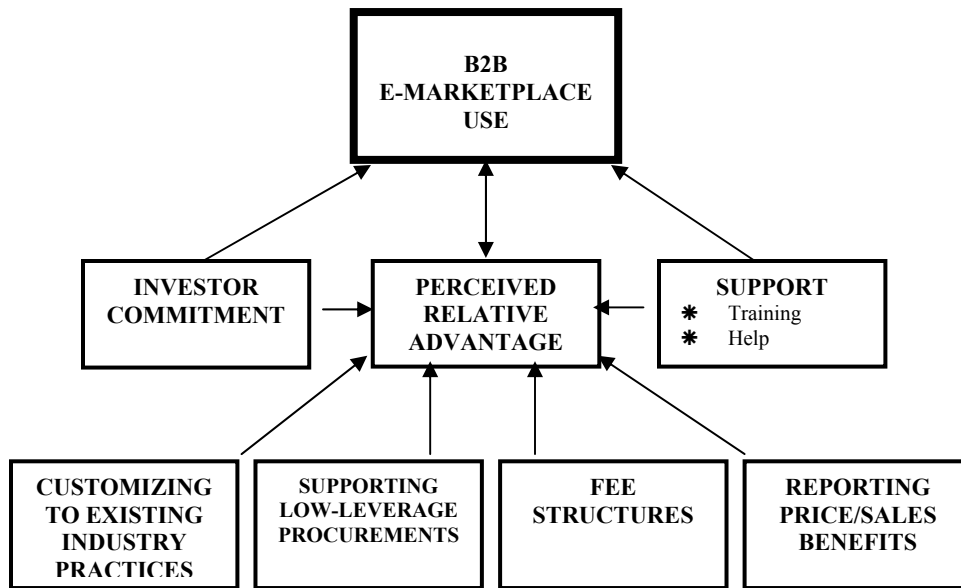


Figure 1. E-marketplace Characteristics Driving B2B E-marketplace Use

	NATIONAL TRUCKING EXCHANGE (NTX)	PEGASUS	C-STORE EXCHANGE (CSX)	RETAIL MATRIX
USE	Over 10,000 transactions/day	Approximately 1,000 transactions/day	3,500 Gulf Coast Oil convenience stores use daily	0 transactions
USE DRIVERS				
PERCEIVED RELATIVE ADVANTAGE	Initially for shipments not covered by prenegotiated contracts, later as a facilitator for prenegotiated shipping contracts	None initially, later yes	Only by Gulf Coast Oil	N/A
Customizing to existing industry practices	Used to facilitate prenegotiated freight contracts	Used to negotiate supplier contracts and purchases from existing contracts	Tried	N/A
Supporting low-leverage procurements	Yes	Yes	N/A	N/A
Fee Structures	No membership fee, members are unaware of the amount of NTX's transaction fees	Membership fees, use fees, costs as a percentage of savings	Monthly membership fee and transaction fees	N/A
Reporting Price/Sales Benefits	Yes	Yes	N/A	N/A
INVESTOR COMMITMENT	Unavailable	Some utilities	No	Unavailable
SUPPORT	Yes	Yes	For retail stores	N/A

Table 1. Comparison of E-marketplace Characteristics Driving B2B E-marketplace Use

Perceived Relative Advantage

The research indicates a B2B e-marketplace’s perceived relative advantage drives e-marketplace use. The two-sided arrow connecting perceived relative advantage and use indicate that the more an e-marketplace is used, the greater the e-marketplace’s perceived relative advantage. We define perceived relative advantage as an e-marketplace’s offerings “being better than the ideas they supersede” (Rogers, 2003, p. 229).

The two e-marketplaces with the highest use offered the highest perceived relative advantage. NTX initially offered a relative advantage for shipments not covered by prenegotiated contracts. In order to achieve greater use, NTX evolved to facilitate prenegotiated shipping contracts. This strategy increased NTX's use. With more shippers and carriers using NTX, use increased. Pegasus' initial release did not offer an advantage over existing industry procedures and many of Pegasus' offerings were not realizable. Once Pegasus modified their e-marketplace to offer an advantage, e-marketplace use increased. With more utilities using and reporting success, the perception of Pegasus' relative advantage increased.

CSX proposed a variety of value propositions offering all members of the convenience store industry supply chain relative advantages. Only CSX's communication offerings were immediately realizable. CSX improved communication between Gulf Coast Oil convenience store owners and their retail convenience stores. CSX did not originally achieve use by the other marketplace members because CSX did not offer these members an immediately realizable relative advantage.

The finding that perceived relative advantage drives B2B e-marketplace use supports previous IOIS studies (Premkumar, 1994, Tabor, 2001) based on innovation diffusion theory.

Customizing to Existing Industry Practices

B2B e-marketplaces were originally designed to bring buyers and suppliers together into an electronic buying community. The goal was to enable buyers to easily shop the supplier population and to offer suppliers access to many more buyers. In most cases, business does not work this way. Buyers and suppliers have worked together for years to develop long-term contracts and relationships built on trust. Free, open e-marketplaces that allow any buyer to purchase from any supplier at anytime undermine these relationships.

The two e-marketplaces with higher use levels, NTX and Pegasus, were initially positioned as free, open marketplaces. After struggling to achieve marketplace use, both e-marketplaces customized their offerings to accommodate the relationships inherent in existing business practices. We define customizing to existing industry practices as changing the marketplace to be consistent with existing industry operations.

CSX tried to customize their e-marketplace to accommodate convenience store industry business practices. Both industry investors (McMurray Distributing and Momentum Manufacturing) provided industry experts to explain convenience store industry operations to the marketplace designers from the distributor's and manufacturer's perspective. As part of this, CSX developed an offering called SmartPromo. SmartPromo was a software package designed to improve the product promotion process for the entire industry. However, even with this offering, neither McMurray Distributing nor Momentum Manufacturing would admit that e-marketplace use would help their business.

This study supports innovation diffusion theory (Rogers, 2003, p. 240) and two IOIS studies (Grover, 1993; Ramamurthy, Premkumar and Crum, 1999) based on innovation diffusion theory.

Supporting Low-leverage Procurements

Supporting low-leverage procurements drives e-marketplace perceived relative advantage, which then drives e-marketplace use. We define low-leverage procurements as situations where individual marketplace members represent a low volume and or non-repeat business to suppliers. In these situations, individual marketplace members do not have leverage to negotiate pricing. Because buyers do not repeatedly purchase these items, they also do not have streamlined systems to support procurement in these situations. Indirect materials procurement, such as office supplies and cellular phones, are typical low-leverage procurement situations.

E-marketplaces can support low-leverage procurements by developing strong vendor relationships. E-marketplaces can do this because the aggregation of all marketplace members represents substantial business to the supplier. Representing a group of members, the e-marketplace can negotiate supplier pricing. The supplier will give the e-marketplace member better pricing than the member could attain individually. E-marketplaces further support low-leverage procurements by designing efficient systems to accommodate these situations. As such, supporting low-leverage procurements drives e-marketplace perceived relative advantage.

Both NTX and Pegasus designed their marketplace to support low-leverage procurements. Members use NTX to procure freight not covered by existing freight arrangements. Shippers post loads when they have shipments that are non-repetitive and/or less than a truckload of freight. Without the e-marketplace, these situations require calling an array of carriers for freight quotes. Carriers will not give their best price because this is non-repeat and/or low volume business. Using NTX makes the procurement process more efficient, and since NTX represents substantial repeat business, carriers offer lower prices. A carrier is in a low-leverage procurement situation when their truck is empty through some portion of a route. Filling empty truck capacity increases profits. Carriers use NTX in these situations.

Since Pegasus has worked to develop strong supplier relationships that the utilities individually could not develop, it offers a relative advantage in procuring indirect materials. To suppliers, Pegasus represents substantial repeat business from an

entire industry, whereas each utility does not. In these situations, Pegasus has negotiated better pricing than the utilities could negotiate. In addition, low-leverage product purchases occur only occasionally so the process is manual. Pegasus' systems increase efficiency in low-leverage procurement.

Low leverage procurements driving relative advantage supports the electronic markets hypothesis prediction that products low in asset specificity and with simple product descriptions will be traded over electronic markets (Malone et al., 1987).

Fee Structures

The fees associated with B2B e-marketplace use and how the fee structures are communicated drives e-marketplace perceived relative advantage, which then drives e-marketplace use. We define fee structures as the financial amount the e-marketplace charges members for its services. The higher the e-marketplace's fees and the less certain the e-marketplace's benefits for the fees, the lower the e-marketplace's relative advantage. Communicating fees where member organizations see an immediately realizable quantifiable benefit in excess of the fees drives e-marketplace relative advantage.

Organizations pay nothing to participate in NTX. NTX charges a transaction fee on every load tendered through NTX's e-marketplace. However, carriers and shippers never see the fee. Shippers post what they will pay for a carrier to haul a load. NTX then deducts its fee and posts the load at shipper's price less its fee. Carriers see the reduced price and can choose to accept the load. The load is tendered at acceptable prices for both parties.

Pegasus' twenty-one founding utilities invested \$105 million dollars in Pegasus. Pegasus also charges utilities an annual membership fee. When Pegasus facilitates a contract, it charges utilities a percentage of the savings over the contract term. For auctions Pegasus charges an event fee. Pegasus originally charged a \$2 transaction fee to both buyers and suppliers for every purchase order executed through the e-marketplace. In e-marketplace use decisions, utilities consider Pegasus' fees vs. the relative advantage before using Pegasus' offerings.

Pegasus originally had difficulty attracting suppliers. Part of the suppliers' reluctance was the \$2 transaction charged to both buyers and suppliers for every purchase order transacted over the e-marketplace. Pegasus was also charging suppliers a membership fee. Pegasus' e-marketplace was not used extensively until the e-marketplace waived up-front supplier membership fees and supplier purchase order fees. Pegasus' offerings with the most use are offerings where Pegasus' fee is a percentage of the savings earned by the buyer or seller. With this approach, utilities compare their current pricing to Pegasus' pricing. Pegasus' fee is a percentage of the savings.

CSX requires members pay up-front fees to use CSX's e-marketplace. Each retail convenience store pays \$100/month to participate in CSX's e-marketplace. Suppliers pay a monthly fee to access aggregated end consumer sales data. CSX also charges fees for transaction processing. Since CSX's fees were up-front and not tied to a quantifiable benefit, CSX's target members had trouble perceiving CSX's relative advantage. As such, most did not join or use the e-marketplace.

This study's finding that a benefit-based fee structure drives perceived relative advantage fits with innovation diffusion theory's prediction that low initial cost facilitates adoption and use (Rogers, 2003). Based in innovation diffusion theory, Premkumar, Ramamurthy and Nilakanta (1994) finding that low cost facilitates EDI adaptation, internal diffusion, and external diffusion provides support for this study's finding.

Reporting Price/Sales Benefits

Both of the high use e-marketplaces measure each member organization's transactions and calculate each member's price or sales benefits from conducting transactions via the e-marketplace. The e-marketplace then reports these benefits to each e-marketplace member. The e-marketplace reports usual price less marketplace price to organizations purchasing items via the e-marketplace. The e-marketplace reports sales volume to organizations selling products or services via the e-marketplace. As such, the model proposes reporting price/sales benefits drives e-marketplace perceived relative advantage. We define reporting price/sales benefits as providing e-marketplace members documentation showing cost savings from procuring goods and services via the e-marketplace and/or documentation showing increased sales from e-marketplace use.

Unfortunately, the data does not allow a contrast between reporting price/sales benefits and not reporting these benefits. NTX and Pegasus reported transaction results and had higher use levels. CSX was only used for corporate communication to Gulf Coast Oil retail stores, and therefore had no transaction results to report. We include reporting price/sales benefits as a perceived relative advantage driver because the participants repeatedly referred to these reports as an indicator of the e-marketplace's relative advantage and their e-marketplace use.

Investor Commitment

This study began when B2B e-marketplaces were new. E-marketplaces and member organizations were both learning how to make marketplaces work. We were involved with Pegasus and CSX during both marketplaces' inception. Both marketplaces envisioned themselves as open e-marketplaces for their entire industry to conduct business. Investor

commitment was critical as both e-marketplaces struggled to achieve use. We define investor commitment as the founding organizations making efforts to use the e-marketplace and/or providing the marketplace feedback to increase the e-marketplace's relative advantage in order for the marketplace to be used.

When Pegasus went live in January 2001, most of its investors tried to use the e-marketplace. When the e-marketplace didn't provide a relative advantage over the investing utilities' existing business practices, the utilities notified Pegasus. As Pegasus improved the e-marketplace by introducing new offerings, the utilities would evaluate and try to use the offerings. These efforts show that at least some of Pegasus' investors were trying to use the e-marketplace. By struggling through and giving feedback, the investors helped Pegasus design offerings that provided the utilities a relative advantage. As part of investor commitment, the investors influenced select suppliers to conduct business with them over the e-marketplace. This component of investor commitment increased e-marketplace use. Investors and select suppliers conducting business over the e-marketplace signaled that the marketplace was a viable business option, further driving e-marketplace use.

CSX's original value proposition was helping corporate offices communicate with their retail convenience stores. CSX envisioned themselves as becoming an e-marketplace for the entire convenience store industry. To do this, CSX needed their investors to use the e-marketplace's offerings and then require their business partners' e-marketplace use.

CSX's initial offerings did not provide an immediately realizable relative advantage to the two industry investors. However, CSX improved and offered a value proposition streamlining the industry promotion process. Pilot tests indicated this offering provided a relative advantage to both of CSX's investors. However, CSX's investors would not use the e-marketplace. The data indicated that these investors did not join CSX because of CSX's relative advantage. As a result they were not committed investors. McMurray Distributing joined CSX primarily to secure the Gulf Coast Oil contract and secondarily to become involved in electronic commerce. Momentum Manufacturing joined because their largest customer, McMurray Distributing, asked them. Momentum Manufacturing was also interested in learning about electronic commerce. Since neither organization joined the e-marketplace because of the e-marketplace's relative advantage to business operations, they were not committed investors and would not perceive CSX's relative advantage to their business operations. In addition, they made no efforts to use the e-marketplace.

Several IOIS studies (Crook and Kumar, 1998; Ramamurthy et al., 1999; Tabor, 2001) link investor commitment to IOIS use.

Support

Support drives perceived relative advantage and e-marketplace use. We define support as helping e-marketplace members identify situations in which marketplace use can provide benefits and training members to use the marketplace

NTX did not originally have sales representatives supporting member organizations' use efforts. During this period, NTX struggled to achieve use. NTX later added sales representatives to help potential members identify situations in which using NTX can reduce freight costs, train members to use NTX, and answer questions associated with using NTX. When NTX began supporting member use, NTX's e-marketplace use substantially increased.

Pegasus did not originally have many people dedicated to supporting the utilities' e-marketplace use efforts. At the start, Pegasus introduced offerings without the utilities' input and without helping the utilities understand or use them. With the utilities struggling to use and see Pegasus' value, Pegasus introduced buyer development managers. Buyer development managers help the utilities identify areas where Pegasus' use can offer benefits and train utilities to use Pegasus. With the introduction of buyer development managers, more utilities started using Pegasus more often.

Pegasus' members also helped one another with e-marketplace use. Pegasus introduced some suppliers to the e-marketplace. Once Pegasus negotiated agreements with these suppliers, the suppliers called on the utilities to do business with them over Pegasus. These suppliers trained the utilities to do business over the e-marketplace. In one example, Office Plus installed icons on the utilities' computers and explained how to use Pegasus to purchase office supplies from their company. In other situations, utilities use of Pegasus was contingent on the utilities' supplier membership and use. Many member utilities influenced their suppliers to join Pegasus, and with Pegasus' support, helped these suppliers do business with them over Pegasus.

CSX had a support center to help retail stores with the e-marketplace. CSX did not have field representatives helping member organizations understand or learn to use the e-marketplace.

Crook and Kumar's (Crook and Kumar, 1998) finding that implementation support drives EDI use supports this finding.

CONCLUSION

This study uses a variety of qualitative methods to investigate an emerging electronic commerce business model—B2B e-marketplaces. This study determines B2B e-marketplace characteristics driving B2B e-marketplace use. This study finds

that perceived relative advantage drives e-marketplace use and the more an e-marketplace is used the higher the e-marketplace's perceived relative advantage. The study further finds that investor commitment and support drive both e-marketplace use and e-marketplace perceived relative advantage. Customizing to existing industry practices, supporting low-leverage procurements, fee structure, and reporting price/sales benefits drive perceived relative advantage.

This study's findings also offer insights to the existing IOIS literature, as well as to a number of theories underpinning this literature including innovation diffusion theory, transaction cost economics, and the electronic markets hypothesis. In particular, the e-marketplace literature does not recognize the model's findings. In addition, the findings discussion indicates very few of the IOIS studies recognize any of these drivers. Finally, neither the existing IOIS nor the e-marketplace literature links these drivers to perceived relative advantage. The few studies that do recognize these drivers link them to use.

There may be several explanations for difference between this study and the previous literature. First, e-marketplaces are a unique type of IOIS that have not been investigated extensively. Second, much of the previous research is grounded in the ideas of existing literature and theories. Because this study is grounded in the perceptions and experiences of organizations implementing e-marketplaces, this study allows new ideas and relations to emerge. Finally, because this study was longitudinal, the data allowed contrasting the absence vs. the presence of several factors that would not have emerged in "snap-shot" investigations.

With analysts (Hamm, 2002) predicting increased e-marketplace utilization over the next ten years, this research offers insights to industries trying to improve their procurement using B2B e-marketplaces. In addition, additional B2B e-marketplace research is necessary. Future research should investigate the research model developed in this paper. Comparing the model to other e-marketplaces will increase the model's insights and generalizability.

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