Electronic Marketplace Support for B2B Business Transactions

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INTRODUCTION

Information systems that link businesses for the purpose of inter-organizational transfer of business transaction information (inter-organizational information systems or IOIS) have been in use since the 1970s (Lankford & Riggs, 1996). Early systems relied on private networks using *electronic data interchange* (EDI) or *United Nations* EDIFACT standards for format and content of transaction messages. Due to their cost and complexity, the use of these systems was confined primarily to large companies, but low cost Internet commercialization has led to much more widespread adoption of IOIS. Systems using the Internet and the *World Wide Web* are commonly referred to as B2B (business to business) systems, supporting B2B electronic commerce.

Technological innovations have led to several forms of B2B Internet implementations, often in the form of online exchanges or electronic marketplaces (Wang et al., 2005). These are virtual marketplaces where buyers and sellers exchange information about prices, products, and service offerings, and negotiate business transactions. They are major components of the supply chains that they support. In addition to substituting proprietary lines of communication, emerging technologies and public networks have also facilitated new business models and new forms of interaction and collaboration in areas such as collaborative product engineering or joint offerings of complex, modularized products. During the years 1999-2001, a number of online exchanges were introduced, but many of these failed (Gallaugher & Ramanathan, 2002) due mainly to an inability to attract participating business partners, but also because potential participants and their business partners did not perceive enough value added through the significant investment they required. Those that have survived are often owned by companies or consortia that are also exchange customers or suppliers.

The objective of this overview is to describe the evolution and the characteristics of B2B Internet implementations, and to discuss management considerations, the evaluation, and adoption of B2B applications, and the technical infrastructure supporting these systems. We also indicate some of the open issues that remain as the technology and its adoption continues to evolve.

BACKGROUND

Although there are many classification schemes available for B2B online exchanges (Choudhury 1997; Kaplan & Sawhney 2000), we will use a more generic and functional focus, with three categories: sell-side, buy-side, and neutral/market-type applications (Archer & Gebauer, 2001). Early B2B sell-side applications featured online catalogs, made available to the Internet community by distributors and manufacturers, often complemented by features such as shopping baskets and payment functionality. Many now provide customized and secure views of the data, based on business rules from contract agreements with individual customers. In some cases, buying processes of the customers are supported, including features such as approval routing and reporting. While sophisticated applications exist to support collaborative functionalities among the participating organizations, such as forecasting or configuration of complex products, many sell-side systems handle only the simpler transactions such as maintenance, repair, and operation (MRO) supplies. Recently, features that support collaboration have become more widely available through both the "vertical" links of supply chain management and the "horizontal" links of buying groups that can represent suppliers or buyers (Wang & Archer 2007a).

Buy-side applications support procurement, moving order processes closer to the end user, and alleviating structured workloads in functional departments such as purchasing and accounts payable. For smaller companies, an affordable alternative is to work through hosted solutions using Internet browsers to access procurement functionality provided by a third party vendor or application service provider (ASP). Functionalities beyond the automation of highly structured procurement processes include production tendering and multi-step generation requests for proposals, as they are relevant for the procurement of freelance and management services. Interfacing purchasing systems to internal systems such as enterprise resource planning systems (ERP) makes it possible to automate commonly used transactions, thus greatly increasing processing speed and reducing costs. Buy-side solutions that involve long-term inter-organizational relationships are typically set up by the purchasing organization, which then controls catalog content, data format, and backend system functionality. Benefits include

a reduction in maverick buying, and freeing purchasing and accounts payable personnel from clerical work to handle more strategic tasks. Suppliers typically benefit from long-term relationships, and in many cases, the relationships between the buyer and its suppliers were in place long before online operations commenced.

The third group of applications, often referred to as B2B electronic marketplaces or hubs, can either bring together multiple buyers and sellers on an ad hoc basis involving various types of auctions, for example, or support more permanent relationships (a many-to-many equivalent to IOIS) (Wang & Archer, 2004). Those that have been more successful are likely to have been sponsored by a consortium (e.g., *GlobalNetXchange*, in the retail industry, sponsored by buying organizations, and *Global Healthcare Exchange* in the healthcare industry, sponsored by selling organizations). They may feature auctions, electronic catalogs, collaborative functionalities, and auxiliary value added functions such as industry news and online forums. The initiator typically controls the catalog content, aggregates supplier input, and provides additional functionality and standardized data access to buyers (Wang & Archer, 2007). These marketplaces may eliminate the need for market participants to link directly to their business partners, circumventing costly value added EDI network services. Their business models typically include service charges based on transaction volume and setup costs. They provide a standard for suppliers to deliver catalog content, increase flexibility if they support access to suppliers and customers outside pre-established relationships, and create customer value through competitive pressure. Participation in such marketplace solutions may also provide a low cost alternative for SMEs (small and medium enterprises), but SME adoption of such solutions is typically driven by their larger business partners who wield significant market power (Archer et al., 2003).

MANAGEMENT CONSIDERATIONS

A market assumes an intermediary role that supports trade between buyers and suppliers, including (Bailey & Bakos, 1997): (a) matching buyers and sellers, (b) ensuring trust among participants by maintaining a neutral position, (c) facilitating market operations by supporting certain transaction phases, and (d) aggregating buyer demand and seller information. Supporting the marketplace through an electronic exchange has characteristics of (Bakos, 1991): (1) cost reductions, (2) benefits increase with the number of participants, (3) potential switching costs, (4) capital investments but economies of scale and scope, and (5) significant uncertainties in benefits. Many of the management issues of B2B electronic commerce systems relate to the need to coordinate decisions and processes among multiple firms, often through differences in business processes, information systems, business models, and organizational cultures.

Early transaction cost theory recognized markets and hierarchies as the two main methods of governance for coordinating flows of goods and services. Markets such as stock exchanges coordinate the flow through supply and demand forces with price as the main coordination vehicle. Hierarchies such as production networks consist of predetermined relationships among customers and suppliers, and rely on managerial decisions to coordinate flows. There are many intermediate forms of governance such as network organizations and strategic alliances (Gulati, 1998). A common theme among all these governance structures is collaboration among the participants, but the level of collaboration varies. These levels can be described as cooperation, coordination, and collaboration (Winer & Ray, 1994). In cooperation, there is little sharing of goods, services, or expertise; coordination requires mutual planning and open communication among participants, who share resources; collaboration involves deeply synergistic efforts that benefit all parties. Collaboration at different levels between buyers and sellers are emphasized by online exchanges, but this can also take place separately among buyers and among sellers (Wang & Archer, 2004b). A recent survey of 89 online exchanges that offer collaboration services identified a range of collaboration functionalities, including "vertical" supply chain collaboration through collaborative fulfillment, private catalogues, product life cycle management, and supply chain coordination and integration. Additionally, "horizontal" functionalities may be offered in the form of buying groups, which can be classified as dealer-type, exchange-catalogue, exchange-negotiation, supplier-initiated, and buyer initiated (Wang et al., 2007b).

The growth of outsourcing arrangements and more cooperative, integrated long-term inter-organizational relationships with a relatively small number of preferred suppliers can be termed a "move to the middle" (Clemons et al., 1993). This can result in the adoption of collaborative functionalities such as CPFR (collaborative planning, forecasting, and replenishment), which may be used to support joint initiatives between large retail customers and suppliers (Holmstrom et al., 2002; Wang et al., 2004a). Distribution of market power is often an overriding factor. For example, auto manufacturers, as theirs is a concentrated industry, are likely to adopt an approach that involves long-term collaborative relationships among business partners rather than the short-term market-driven relationships that traditionally characterized this industry. On the other hand, relationships among companies in fragmented industries such as construction are typically short-term, with low levels of trust, and transactions such as online procurement are more likely to be through B2B tendering and auctions (Stein et al., 2003).

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