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#ITP4364

MULTI-DIMENSIONAL B2B AUCTIONS FOR ELECTRONIC COMMERCE[1]

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INTRODUCTION

Since the early days of Electronic Data Interchange (EDI), many business-to-business (B2B) models of electronic commerce have been developed. Currently, the fastest growing segment of e-commerce is the B2B Web-based marketplace [11]. The dynamic nature of this business environment is driving major changes in business strategies and models, marketing, and information systems development. In order for new companies to compete in this extremely competitive environment, they must understand the nature of the market, and the vast commitment of resources necessary to establish a presence in that market.

Early online auction models were based on price alone. Today, businesses must consider the total cost of the transaction, including transportation, storage, financing, and insurance. Businesses must also consider whether an offering matches qualitative and quantitative specifications besides price (delivery date and conditions, quantity range, product quality, service, etc.) [6]. These multiple variables have increased the complexity of B2B auctions and led to the implementation of multidimensional B2B auctions [9].

LITERATURE REVIEW

The e-marketplace is an Internet location where buyers and sellers can come together to transact business. B2B auctions started in the basic commodity markets, but are rapidly moving into more complex industries. The major driving force behind the growth of online auctions is the fundamental concept of market efficiency, which exists when all buyers and sellers have complete information and supply is in balance with demand. Perfectly efficient markets do not exist, but the Internet has the potential to move markets in that direction by its instant communications capability. Where once negotiations were conducted by human, Internet-based negotiations can be performed at a fraction of the cost [8].

Auction Models

Auction models take different forms in a continuum from one buyer and one seller to many buyers and sellers. The classification of B2B auctions is based on whether the price is ascending or descending, who initiates the bidding process, and the interactivity format (which is presented in Figure 1).

Figure 1. B2B Auction Market Framework *[9, 10]*

BUYERS

SELLERS		**One**	**Many**
	One	Negotiations	Forward Auctions
	Many	Reverse Auctions	Markets/ Exchanges

The simplest auction model is negotiation. In traditional or *forward auctions* the only factor determining the winning bid is usually the highest price. *Reverse auctions* are used primarily for procurement. *Exchanges* are generally very fast and efficient and work best for commodities with well-defined attributes [7].

Direction of Bidding. *English auctions*, typically used in forward auctions, start the bidding at the lowest acceptable price and solicit higher bids until the auction closes. The highest bid wins. In *Dutch auctions*, the bidding starts at a high price and decreases by successive bids until the auction closes. It can be used in reverse or procurement auctions. A *Vickrey auction* is like an English auction except that the second highest sealed bid wins. In *Japanese auctions* the bidding begins at a low price and increases in fixed amounts. As the amount increases, bidders drop out until there is only one bidder remaining.

Markets. B2B auctions are also categorized based on the market served. A *horizontal marketplace* specializes on limited products/services for many industries. A *vertical marketplace* serves only one industry with a broad range of products/services [1].

Technology

Technology infrastructures are mission-critical to B2B auctions. Establishing such an infrastructure is an extremely complex project. Since the B2B marketplace can give a "winner take all" advantage to the first in an industry, having the shortest possible time to market is a necessity [4,5]. Currently, most B2B marketplaces support only rudimentary online transaction processes that do not truly automate supply-chain processes. However, e-marketplaces now require additional auction models, more advanced catalog management, collaboration, integration, and direct materials procurement capabilities as well as other third party e-commerce services (global payment, escrow, insurance, shipping, logistics, inspection). In addition, these B2B auction environments also require fast implementation (short time to market), flexibility to integrate many platforms, support for real time auctions, 24x7x365 availability, and customer service/relationship management support. These disparate business applications require integration to execute a B2B exchange, and fuel the rapid evolution of technology developments to support e-marketplaces.

SURVEY

A survey was conducted to better understand the perceived critical success factors, technology requirements, and the extent to which current technologies meet those requirements, for the B2B auction industry. The survey also collected information about the usage patterns of current B2B auction sites. Invitations to participate were sent to 133 e-marketplaces by email, with a reminder two weeks after the original message. Fifteen companies returned completed surveys (11.3 %).

This paper appears in the book, *Managing Information Technology in a Global Economy*, the proceedings of the Inforrmation Resour es Management Association International Conference. Edited by Mehdi Khosrow-Pour.

Auction Models, Services, and Revenue Sources

Respondents' firms utilized twelve different auction models and offered fourteen types of intermediary services. Many firms used multiple auction models. Twenty-nine percent said their auction models were very complex to implement, 43% said complex and 29% said average complexity. The number of transactions supported by the B2B sites ranged from one per week to 200 per day. All respondents, with one exception, defined their markets as B2B. Table 1 summarizes revenue sources for the companies surveyed.

Table 1 Revenue Sources

Revenue Source	Companies
Provide information at no charge to participants	9
Sell advertisements/affiliates links	4
Brokerage fees paid by sellers	12
Brokerage fees paid by buyers	7
Commissions from affiliates	3
Sell subscriptions to buyers	3
Sell subscriptions to sellers	3
Revenue for other types of lead generation	2
Provide workflow tracking/collaborative services for projects	1
Refurbish/ configure equipment	1
Revenue from:	
credit checks	1
logistics	4
fulfillment	3
insurance	2
other components of transaction process	4

Privacy and Security

Eighty percent of respondents used factors like customer service records, third party ratings, warranty, and performance to prescreened sellers. All respondents prescreened buyers using creditworthiness (73%), identity verification (60%), third-party ratings (27%), or performance (33%) as criteria.

For 86 % of respondents, their marketplace provided support for anonymous bidding, and 57% for anonymous negotiations. Participants were primarily notified by e-mail regarding bids and changes. Other notification methods included regular mail, Web site, telephone and mobile telephone messaging. Third parties (transportation, financing, insurance, appraisals, logistics, etc.) were able to participate simultaneously with buyers and sellers in 73% of e-marketplaces.

All companies tracked failed transactions to maintain the quality of participants and enable continuous process improvement. Audit data about the company was provided by 36% of them.

Success Factors

Respondents equally ranked "security and privacy of the bidding process" and "creditability of company's specific marketplace" as the most important e-marketplace success factors, with "software support" as a close second. Other success factors ranked as "very important" by more than half the respondents included "participant trust in auction process", "ability to protect participant anonymity/privacy", and, "critical mass of buyers and sellers". Respondents overwhelmingly rated the factor "insufficient number of buyers and sellers" as contributing most to the failures of B2B marketplaces.

Technology

Respondents were asked what functions their auction/exchange software supported, and which additional functions would be desirable. The results are presented in Table 2.

Table 2 Technological Functions

Function	Currently supported (%)	Desired additional functionality (%)
Access control management	64	8
Automated approval mechanism	50	15
Business intelligence reporting capabilities	36	23
Buyer accounts supporting multi-item RFQ's	57	15
Consulting resources	29	31
Content management	79	23
Customizable	64	15
Demand chain	21	15
Document exchange, including images	43	38
Fulfillment expertise	36	8
Fully automated bidding	71	15
Indicative bidding rules (non-binding bidding)	21	23
Integration of internal & external systems	64	8
Multiple currencies	36	38
Multiple languages	14	46
Multi-variant product/ bid criteria	64	23
Network platform	50	0
Online community connecting buyers/ sellers	71	8
Participant education/scenario simulation	21	31
Post-bid negotiation (one-to-one)	21	38
Rapid application development	43	8
Real time bid/ask	57	46
Real time wireless communication capabilities	21	23
RFQ filtering	36	31
Scalability	86	15
Secure bidding via encryption	64	15
Secure membership registration	86	15
Seller catalogs	36	38
Supply chain management	36	15
Trading models:		
Procurement/RFP/RFQ	57	15
Auctions	93	15
Exchange	79	23
Reverse auction	57	15
Catalog sales	43	23
Work flow management for projects	29	15

DISCUSSION AND IMPLICATIONS

This study explored the general state-of-the-art in the B2B auction community, in particular multidimensional B2B auctions, in hopes of identifying issues to consider when making a decision about infrastructure components to include in an e-commerce B2B auction platform. There are some important considerations highlighted by the study:

- **Critical Success Factors**: With the high ratings among survey participants for the importance of credibility of auctioneer and trust in the auction process, preventive policies and controls should be implemented, and it should be clearly communicated to participants that the company adheres to its confidentiality and privacy policies.
- **Technology Solutions**: With the rapid evolution of new technologies, companies should stay abreast of new **standards** for the IT infrastructure, and anticipate future trends and evolving standards in the industry. Companies should especially consider incorporation of new standards like XML and wireless standards as they will be necessary to further develop the exchange of information.
- **Third Party Services**: It is noteworthy that nearly all respondents to the survey enabled simultaneous third party participation in the auction/negotiation process between buyers and sellers. Many experts believe that these added services are becoming a necessity for business survival.

CONCLUSION AND FUTURE RESEARCH

It is predicted that B2B online business will become increasingly more saturated with auction mechanisms in the near future. B2B marketplaces will succeed by offering additional value-added services [12]. To develop the potential for value-added services, auctions must integrate software systems, as well as add more com-

prehensive commerce service capabilities such as global payment systems, and financial, logistics, insurance, inspection, and shipping services.

Investment models will change, replacing "return on investment" with "return on relationship", which will be measured in terms of market expansion, revenue per customer, and customer satisfaction metrics [2]. A business must identify what is important to customers to enable its differentiation from the other online marketplaces.

To ensure a good "return on relationship", it will be necessary for online B2B auctions and exchanges to meet their customers' increasing expectations in the areas of privacy, trust, and security. Some of the authors' future research efforts will focus on identification of specific trust, privacy and security issues from both buyers' and sellers' perspectives, and the challenges to online B2B auctions and exchanges in meeting those customer demands.

[1]This research was partially funded by a grant from Virginia's Center for Innovative Technology, in collaboration with the Virginia Tech Information Center.

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