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WHEN WE THINK OF AUCTIONS, fashionable ecommerce Web sites like eBay and Yahoo! Auctions spring to mind. The popularity of auctions has encouraged the growth of auction support software for both buyers and sellers. Companies such as Auction Watch claim to have the complete auction management system, allowing buyers to manage their bids and sellers to bulk load the items they are selling to many different auctions sites at once. These auctions usually involve a site where a seller posts items or services for sale and many bidders attempt to buy them. But in reverse auctions, one buyer usually hosts a site listing items or services it needs and asks many sellers to bid on the prices. In this month's informative column, Diane Parente, Ray Venkataraman, John Fizel, and Ido Millet discuss reverse auctions. They explain that new online auctions are broadening their appeal by including a larger pool of participants; expanding the range of products and services well beyond traditional commodities; and improving the availability of data about the auction process not only to participants but to academic researchers as well.

B2B Online Reverse Auctions: What's New?

Diane H. Parente, Ray Venkataraman, John Fizel, and Ido Millet, School of Business, Pennsylvania State University - Erie

Auctions have long been a popular method for buying and selling products and services. With the advent of the Internet and the proliferation of Web users, auctions are moving online and gaining in popularity because they reduce transaction costs for both suppliers and buyers. Hence, online auctions can have a significant impact on profitability for both buying and selling firms (Van Heck, 1998).

While the theoretical and empirical research bases for traditional auctions are well established (see, for example, Engelbrecht-Wiggans, 1980), current understanding of online auctions is still limited (Van Heck, 1998). The rapid growth of online auctions underscores the need for research in this domain.

So, what's new about the auctions of yesterday and those of tomorrow? Where are the opportunities to learn more about the successes and failures of online auctions? How can researchers leverage the technology involved in online auctions to advance the frontiers of knowledge? In the following section, we identify the differences in the "who, what, and how" of traditional versus online auctions in order to determine what's new about online auctions.

Who's Involved in an Online Auction?

Auctions offer trading opportunities for both buyers and sellers and assure prudent execution of contracts (Turban, 1997). While the business-to-consumer (B2C) has been the most popular category of online auctions, business-to-business (B2B) online auctions are emerging as a prominent business model (Rupley, 2000). In fact, B2B online auctions totaled $109 billion worth of transactions in 1999 alone, and that number is expected to grow to $2.7 trillion by 2004 (Blackmor, 2000). Within the category of B2B online auctions there has been rapid development of reverse auctions (Turban, Lee, King, & Chung, 2000). In reverse auctions the buying company hosts the online auction and extends invitations to potential suppliers to bid on announced request-for-quotations (RFQs). Simply stated, a reverse auction has one buying firm and many sellers.

In addition to savings in purchase price, reverse auctions enable buyers to react quickly to market fluctuations and also save the time that would have been required for the buying company in identifying and contacting the individual suppliers (Vigoroso, 1999).

Through reduced search and communication costs, the Internet enables the buyer organization to access a large number of potential suppliers. However, as this large pool includes both efficient and inefficient suppliers, the task of evaluating and developing appropriate strategies for selecting potential suppliers assumes greater importance for the buyer.

Past research on traditional procurement has identified that factors such as quality, delivery reliability, trust, economic performance, and financial stability are important criteria for selecting suppliers (e.g., Choi, 1996). While these factors are equally important in an online auction environment, there are additional supplier characteristics that can have a significant influence on the success of online auctions. As the buyer in an online reverse auction is seeking the best possible price, the cost reduction capability of the supplier is an important factor. The information technology (IT) sophistication, the familiarity and the comfort level of the suppliers for conducting business online will have an impact on their participation level in online auctions.

A major limitation of traditional auction methods, caused by time and location constraints, is the potential lack of sufficient bidder participation. Electronic auctions reduce these constraints and lead to more participants (Klein, 1997; Turban, 1997). Online auctions are open to any supplier with access to the Internet. Once the buying firm opens the gates to more than "prequalified" suppliers, many more firms can have access to supply products to companies that were previously out of their reach.

What's new in "who"? Online auctions have a larger pool of auction participants with a wider range of qualification status and capabilities. In addition, these suppliers will be obtained through greater research but less "face to face" or direct supplier development cost.

What's Being Auctioned?

Both the popular (see, for example, Segal, 2000; Stamborski, 2000) and the academic press (see, for example, Brack, 2000; Croom, 2000) discuss the virtues of online reverse auctions for both buying and supplying MRO (maintenance, repair, and operating) supplies, standard or commodity products. For example, one company reports savings of over 15% in one purchased lot of safety glasses.

While we intuitively understand an auction for standard products, in fact, auctions are the preferred methods of commerce for nonstandard products or when the true value or market price of the good is uncertain (McAfee & McMillan, 1987). One use of online auctions is to sell or find used capital equipment or surplus equipment (Brack, 2000). Another example is the reverse auction for programming services and specialized products.

What's new in "what"? Online reverse auctions are providing access to products and services that span time and space or geography. We previously identified auctions with commodities. Now the paradigm is opened to many other product and service types.

How's the Auction Conducted?

Reverse auctions are a transaction format that allows organizations to procure goods and services at the lowest possible price. While forward auctions feature increasing incremental bidding, reverse auctions feature decreasing incremental (decremental) bidding. The format lets participants submit bids where the bidder with the most advantageous bid to the firm will win. In a reverse auction, prospective buyers can list any items they wish to buy, and then sellers bid to provide the best price. The consumer decides the exact specifications of each item, instead of the specifications being dictated by the seller.

There are a variety of auction formats and many characteristics that define auctions. These formats and factors are valid for traditional or online auctions. The number of bidders and pattern of bidding is determined by the rules of the auction and its surrounding environment. Relevant environmental factors include the type of the good being sold, risk preferences of bidders, the time frame of the auction, and the available information concerning the bidding process.

One auction characteristic that may influence auction success is auction time or the auto-extension of the bidding period. Most auctions are initiated with advanced notice of a specific closing time. The fixed end time poses an incentive problem—the early bid serves no benefit to the bidder but reveals information to her rivals. The typical model of the English auction would project that bidders would quickly bid their valuations and the auction would end with the highest valuation bidder receiving the price of the valuation of the second-to-last bidder. Yet many auctions with fixed-end times are experiencing "sniping" or submission of bids in the final minute of an auction. Late bidding deprives rivals of the ability of seeing one's bid and undercutting it. Late bidding facilitates collusions or independent pricing well above that predicted by auction theory.

Auction "overtimes" can restore the desirable bidding properties of reverse auctions. An overtime, or extension, to the auction is invoked if any bidding occurs in a designated final phase of the auction (e.g., bids in the last two minutes). The overtime may iterate if late bidding continues in the previous overtime. The additional time allows bidders the opportunity to react to "snipers" and minimizes the potential for pricing rings. A disadvantage of overtime is that it obligates serious bidders to return to the auction at closing time and remain through subsequent extension periods. The effect on bidder participation has yet to be examined.

Late-bidding problems may also be overcome by restructuring the information content of the auction. In an English auction where information on all bids of all bidders is readily available, it is easy for firms to detect and quickly respond to cheaters in a collusive pricing ring. That is, information facilitates the creation of cooperative pricing within the structure of the auction. Late bidding or sluggish bidding may simply be the signal that cooperative pricing exists. As stated above, the foundation for a pricing ring may be weakened with extending bidding periods but limiting bidding information may have the same result. For example, the auction may be designed to provide only information on the low bid, not the bidder, or provide information only on the supplier's own rank in the bidding process. Each of these mechanisms creates the opportunity for cheating on the pricing ring–cheating that can occur without detection or punishment. Given limited repercussions and significant increases in profits for cheaters, attempts at cooperative pricing are likely to fail.

What's new in "how"? While mechanisms are basically the same, the ability to collect data on the process is significantly enhanced by the technology. Additionally, the potential anonymity of the bidders allows more control of the auction by the buying firm. Information may be revealed or withheld as the firm sees fit.

What's in It for Us?

For academics like us, the research opportunities are incredible. Decision scientists will find that information currently available on the specific times, dates, intervals, and participants at the bid level has never been available in such volume as it is now. The opportunity to have transaction-level data on thousands of auctions will make some of us salivate at the challenge of modeling the process. Management types will hypothesize the import of various auction and participant characteristics in the final auction results. Human resource specialists will predict changes in the job functions, skills, and abilities of those involved in e-business. Operations managers will identify cost savings due to changes in the supply chain and, further, strategists will forecast shifts in industry structure caused by the impact of an online, real-time model in business.

As far as practitioners are concerned, if industry provides the data to the academic community, both will be able to participate in a true synergistic relationship. The outcome of academic research has the potential to remove billions of dollars from the cost of goods and services. We can understand what works and what doesn't.

A challenging research arena and a more competitive business environment? Sounds like the classic "win-win"! ■

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NAMES IN THE NEWS

CAROL LATTA, Feature Editor, Home Office, Georgia State University

Ira Horowitz, University of Florida, is spending seven months as a visitor at Adelaide University (Australia) and loving every minute of it. In the fall, he will be teaching in an overseas study program in Paderno Del Grappa (Italy).

Rui Sousa, Assistant Professor in Operations Management at Universidade Católica Portuguesa (Portugal), has been awarded the 2000/2001 EFQM PhD Thesis Award for his thesis entitled "Quality Management Practice: Universal or Context Dependent? An Empirical Investigation." This international award is given by the European Foundation for Quality Management (EFQM) for the best PhD thesis in TQM, recognizing an outstanding contribution to the further development of TQM, learning value for management, and degree of innovation and applicability of the findings. Rui received his PhD from the London Business School (advised by Prof. Chris Voss). He has published in *Production and Operations Management* and in major international refereed conferences. His present research interests include quality management, manufacturing strategy, and e-operations/e-services.

Steve Walton, Assistant Professor of Decision and Information Analysis at Goizueta Business School, Emory University, has been selected as one of the *Journal of Operations Management* 2000 Reviewer Excellence Award recipients. Steve has also recently been recognized for his efforts teaching. He was awarded the Emory Williams Distinguished Teaching Award, a university-wide teaching award, and has twice been chosen as the BBA Distinguished Educator. ■

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