

Overview of Electronic Auctions

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INTRODUCTION

Online auctions are one of the most popular and effective ways of trading goods over the Internet (Bapna, Goes, & Gupta, 2001). Thousands of items are sold on online auctions everyday including books, toys, computers, antiques, and even services. As an example, eBay (<http://www.ebay.com>), the largest online auction house, has more than 241 million registered users today, and in the year 2006 alone, eBay recorded consolidated net revenue of \$6 billion (eBay, 2007). On any given day, there are more than 78 million items listed on eBay, and approximately 6 million listings are added per day. It has also spread its wings to other countries outside the USA, and to date it is present in 24 countries. In addition to eBay, there are more than 2,600 auction houses that conduct online auctions (common sites include Amazon.com, <http://www.amazon.com>; Yahoo! Auctions, <http://auctions.shopping.yahoo.com>; priceline.com, <http://www.priceline.com>; and uBid, <http://www.ubid.com>). These auction houses conduct many different types of auctions according to a variety of rules and protocols.

BACKGROUND

An auction is defined as a bidding mechanism described by a set of auction rules that specify how the winner is determined and how much he or she has to pay (Wolfstetter 2002). Auctions are widely used in many transactions including the sale of arts, wine, fresh products, diamonds, and real estate. In fact, auctions are not new. They were used to allocate scarce resources in Babylon from about 500 B.C. (Shubik, 1983). During those times, an annual Babylon marriage market was conducted where men had to bid for their prospective wives. The richest Babylonians who wished to wed had to bid against each other for the loveliest maiden, while the poorer ones had to settle for the less beautiful ones. Moreover, in ancient Rome, auctions were used in commercial trade to liquidate property and to sell surplus spoils of war on the battlefield (including plundered booty). Since then, auctions have flourished in many other civilizations, but they became more prominent in the 17th century where they were used to liquidate goods and to sell unsalable goods (such as domestic animals, tobaccos, natural resources, horses, and slaves) at the end of the season.

The practice of auctioning goods has been popular throughout the years because auctions are an extremely effective way of allocating resources to the individuals who value them most highly (Reynolds, 1996). This effectiveness means that very many variants have been produced (Wurman, Wellman, & Walsh, 2001); however, there are four main types of single-sided auctions that are commonly and traditionally held (Klemperer, 1999):

- the ascending-bid auction (also called the open, oral, or English auction),
- the descending-bid auction (also called Dutch auction),
- the first-price sealed-bid auction, and
- the second-price sealed bid auction (also called Vickrey auction).

In more detail, in an English auction, the auctioneer starts the auction with a low price that is then successively raised until one bidder remains. That remaining bidder wins the object and pays a value equivalent to his or her bid value. This type of auction is commonly used when selling antiques, artwork, and houses. The descending auction is the opposite of the ascending-bid auction. The auctioneer starts at a very high price and this price is then progressively lowered until there is a call from any bidder to claim the item. The first bidder who calls out wins the object at the current price. This auction is also called the Dutch auction because it is used in the sale of flowers in the Netherlands (van Heck & Ribbers, 1997). Fish and tobaccos are also sold in a similar way in Spain, Israel, and Canada (Klemperer, 1999).

The last two auctions are sealed-bid auctions. In the first-price sealed-bid auction, each bidder submits a single bid independently without knowing what the others bid. When the auction closes, the bids are opened and the winner is the bidder with the highest bid; he or she gets the item at a price equivalent to the bid value. First-price sealed-bid auctions are used in auctioning mineral rights in government-owned land and are also sometimes used in the sales of artworks and real estate (Klemperer, 1999). Finally, the second-price sealed-bid auction works in the same way as the first-price sealed-bid auction, but the price paid by the winner is equivalent to the second-highest bid. This type of auction is widely used for auctioning stamps, autographs, and Civil War memorabilia by mail (Lucking-Reiley, 2000b; Rothkopf, Teisberg, & Kahn, 1990).

Against this background, an online auction can be defined as an Internet-based version of a traditional auction (Jansen, 2003). The major difference between the two types is the additional degree of flexibility in the way the online variety is conducted. Specifically, in a traditional auction setting, the auctioneer and the bidders gather in one room at a given time to decide who gets the item and at what price. Such auctions generally last only for a few minutes or even seconds for each item sold. This rapid process gives very little time to the auction participants to make decisions, so they may decide not to bid in the auction. As a consequence, the sellers may not get the highest possible price for their goods (Turban, Lee, King, & Chung, 2000). Apart from that, bidders are usually required to come to the auctions, and this practice leaves out many potential bidders that may not be able to attend the auction sessions. It may also be very difficult for the sellers in traditional auctions to move their goods to the auction site (especially when the items are bulky), and there may be a large cost associated with operating the auction since the sellers have to rent the auction site, auctioneers and other employees need to be hired, and the auction needs to be advertised in advance.

Things are somewhat different in the online case. In particular, many of the geographical and temporal limitations of the traditional auctions are removed (Lucking-Reiley, 2000a). Specifically, the consumers can be sitting in the comfort of their homes while participating in an online auction that may be located many thousands of miles away. Moreover, online auctions generally last for days and weeks, giving the bidders more flexibility about when to submit bids. Online auctions also allow sellers to sell their goods efficiently and with little action or effort required. Apart from that, sellers have fewer problems of getting a large group of bidders together on short notice because of the availability of a large number of online bidders distributed across the globe. This creates a larger market for the goods on sale.

In summary, online auctions provide a selection of goods that Internet communities can buy or sell, allowing the consumers a greater chance of getting their goods and the sellers a greater chance of selling their goods. Since online auctions offer a wide array of items, generally speaking, there are likely to be many online auctions that sell similar items. For example, a search for the term *digital camera* using the auction search engine AuctionSeek (<http://www.auctionseek.net>) yields 49,768 results. The current bid prices range between \$1.00 and \$18,000, and the duration of these auctions range between less than a minute and a week. This means it is quite possible for buyers to get a bargain based on the fact that there is a wide selection of choices with a variety of prices. Online auctions have also been used by sellers to dispose of aging items, unwanted items, and excess items to the community of buyers who may require them. This is the reason why online auctions are an ideal place to search for collectors' items and for hard-to-find items (Turban, 1997).

From the sellers' perspective, online auctions are the perfect place to trade goods due to the presence of a huge number of bidders that are distributed globally (Lucking-Reiley, 2000a). There are of course some disadvantages of online auctions such as the bidder's inability to physically view the item being auctioned off, or the possibility of fraud. However, generally speaking, the benefits outweigh the risks.

ONLINE AUCTION ISSUES AND CHALLENGES

Online auctions have been the focus of attention of many academic researchers because of its complexities and its dynamics. Historical data from eBay are downloaded and analyzed to investigate the bidder behaviors and the bid arrivals, and to predict the closing price of a given auction. However, in order to study these, one has to understand the auction settings, the bidding and selling processes, as well as the different types of auctions that may be employed by the auction houses.

The most common format of online auctions that are used by most auctions houses is the ascending-bid auctions constrained by time. Each auction is given a start time and an end time, and bidders are free to post bids anytime while the auction is on going. The winner is the one that posts the highest bid. However, this type of auction can be further classified into a variety of options. For example, eBay offers five options: reserve-price auction, private auction, multiple-item auction, "buy it now," and best offer. The reserve-price auction allows the seller to fix a reserve price, which is the minimum price that the seller is willing to accept for the item being sold. The seller is not obligated to sell the item if the reserve price is not met.

The seller can also choose to create a private auction in which the buyer's user ID does not appear in the listing or in the listing's bid history. Only the seller is authorized to view the buyer user IDs associated with the listing. This kind of auction is usually used to sell high-priced items or approved pharmaceutical products. The multiple-item auction, also known as the Dutch auction (this is not the same as the traditional Dutch described earlier), allows the seller to offer multiple identical items for sale. Each bidder is required to enter the quantity required and the bid amount for each item. The winning bidders are determined in order of bid price per item and will pay a price equal to the lowest winning bid. A variation of this auction style is the Yankee auction in which the successful bidders pay what they bid.

The buy-it-now option enables the bidder to purchase an item when he or she wants it at a known set price without having to wait for the online auction to end. During the bidding period, the buy-it-now option is only available for a limited time. The best-offer feature allows sellers to receive price-based offers from buyers that can be accepted at the

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