A New Dimension of Electronic Auction Market Research: The Case for Participant Experience

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ABSTRACT

The impact of participant experience on financial outcomes in online auction markets has been widely ignored in the IS literature. This paper reports on research in progress intended to remedy this oversight. A high level of buyer experience is found to significantly decrease the total cost of acquiring a commodity item in an online auction market, while a high level of seller experience is found to significantly increase total revenue. A significant interaction effect between participant experience levels is also shown to exist. Taken in sum, the results highlight the important role played by participant experience in online auction outcomes. It is therefore argued that future research in this area should include participant experience as a predictor of financial outcomes, and that past research ignoring participant experience should be reexamined in light of the current paper's findings.

Keywords

Electronic auction markets, participant experience, information processing theory, decision-making.

INTRODUCTION

While much has been learned regarding the antecedents of quality decision-making in online auction markets, little attention has been given to the role of participant experience. This oversight is particularly vexing in the face of Gilliland et al's call for a greater recognition of the effects of prior experience in decision-making research (Gilliland, Wood, and Schmitt, 1994). This paper reports on research in progress intended to help remedy this oversight by examining the impact of participant experience on financial outcomes in online commodity auctions. Commodity item auctions are at the center of this investigation because most B2B auctions involve commodity items, and because the majority of items sold in online auction markets are commodity items (Soper, 2006). These auctions are becoming increasingly important as organizations evolve their operational strategies to include electronic markets as cost-saving strategic options for sales and procurement. Understanding the behavioral mechanisms and processes that yield desirable financial outcomes in online auctions is therefore of vital importance to the future of many organizations. This paper contributes to this understanding by using information processing theory (IPT) to guide an empirical examination of the role of participant experience in online commodity auctions. The findings indicate that buyer and seller experience have a direct impact on financial outcomes in online commodity auctions, and that they interact to affect those outcomes. It is therefore argued that future research examining electronic auction markets should carefully consider the impact of participant experience on outcomes in those markets.

THEORETICAL FOUNDATIONS, HYPOTHESES, AND RELATED WORK

IPT puts forth a model of skill acquisition that provides a great deal of insight into participant behavior in online commodity auctions. This model uses the distinction between declarative and procedural knowledge to show how skill acquisition proceeds from a cognitive to an associative stage (Anderson, 1990). Under this model, a novice participant in the cognitive stage possesses only declarative knowledge (i.e., factual knowledge) of the online market environment. As the participant gains experience with the environment, she enters the associative stage in which her declarative knowledge is supplanted by procedural knowledge (i.e., knowledge of a skill). Once in this stage, the participant has resolved errors in her initial understanding of the electronic market environment, and utilizes increasingly effective tactics and strategies to improve her performance. It is therefore expected that experience will yield improved financial outcomes for both buyers and sellers in online auction markets.

Despite the predictions of IPT, there are several reasons to believe that experience will not affect electronic auction outcomes. Yates et al., for example, found experts to be less attentive to new information than novices (Yates, McDaniel, and Brown, 1991). It has also been shown that experience does not necessarily impact accuracy (Paese and Sniezek, 1991), and that experience can lead to premature truncation of the decision process (Dukerich and Nichols, 1991). Nevertheless, IPT clearly predicts that experience will yield increasingly desirable outcomes for buyers and sellers of commodity items in electronic auction markets. Thus:

> *H1: As buyer experience increases, the total cost incurred by the buyer in acquiring a commodity item in an online auction market will decrease.*
>
> *H2: As seller experience increases, the total revenue generated through the sale of a commodity item in an online auction market will increase.*

The financial interests of the buyer and the seller are clearly in opposition in online commodity auctions. Whereas the seller's goal is to generate as much revenue as possible, the buyer hopes to acquire the item at the lowest cost possible. Regarding this situation, IPT predicts that the ability of an experienced seller to generate above-average revenue will deteriorate as the experience of the buyer increases. Thus:

> *H3: Experienced sellers will realize significantly greater financial gains through the sale of a commodity item in an online auction market when dealing with inexperienced buyers than with experienced buyers.*

Several other factors are known to impact financial outcomes in online auctions: The use of the market's "Buy-It-Now" feature, for example, has been found to impact the total revenue generated by the seller (Yoo, Ho, and Tam, 2006). Additionally, reputation has been posited to indicate the trustworthiness of the seller, thereby impacting financial outcomes (Bruce, Haruvy, and Rao, 2004). Although sellers with high reputations have been found by some researchers to command price premiums (McDonald and Slawson, 2002), others have found no such benefit (Resnick and Zeckhauser, 2002).

Buyers rely on the behavior of others to adjust their product valuations and pre-screen comparable item listings (Heyman, Orhun, and Ariely, 2004). More specifically, the number of bidders for an item has been posited to signal the item's value to other bidders, thereby impacting the auction outcome. Many buyers prefer to bid on items for which several bids already exist rather than bidding on comparable items with no bids (Dholakia and Soltysinski, 2001). Additionally, a low opening bid price can attract more bidders to an item listing, yielding a higher final sales price (Bapna, Goes, and Gupta, 2001; Hossain and Morgan, 2003). The condition of the commodity item being sold (i.e., new or used) is also expected to impact the final sales price. In addition to the potential impacts of experience, these factors will therefore be considered when examining auction outcomes.

RESEARCH METHODOLOGY

Using the definition of a commodity as "a mass-produced unspecialized product" (Merriam-Webster, 1998), seventeen categories in the online market were identified as commodity categories[1]. Three products were chosen at random for data collection from each category. An *a priori* power analysis indicated that a minimum sample size of 1,145 was necessary to detect a small effect with eight predictors at $p = 0.05$ and power = 0.95 (Cohen, 1988). The final dataset consisted of 8,428 cases, thereby yielding increased statistical precision and guaranteeing a minimization of the Type II error rate.

[1] The following were classified as commodity categories: Books, Business/Industrial, Cameras/Photo, Cell Phones, Clothing, Shoes/Accessories, Computers/Networking, Consumer Electronics, Crafts, DVDs/Movies, Health/Beauty, Home/Garden, Music, Musical Instruments, Pottery/Glass, Sporting Goods, Toys/Hobbies, and Video Games.

An automated agent was used to retrieve data from completed auctions for each of the fifty-one target items. Each completed transaction was examined to ensure consistency among the set of product data collected for each target item. Testing of the hypotheses required the collection of the final sales price, shipping cost, and buyer and seller experience fields, while the item condition (i.e., new or used), seller reputation score, total number of bids received, whether "Buy-It-Now" was used, and the starting bid were also collected as covariates. The dependent total cost/revenue construct was computed as the sum of the sales price and the shipping cost, after which the data were standardized at the product level to form a basket of products representing the commodity portion of the electronic auction market as a whole (Cohen, Cohen, West, and Aiken, 2003). Lastly, the interaction term present in H3 was computed.

To test the hypotheses, three OLS regression models were constructed in which the total cost/revenue measure served as the dependent construct. The models examining H1 and H2 respectively regressed the dependent construct on buyer and seller experience, while the model examining H3 regressed the dependent construct on the interaction term. For H3, only those cases in the dataset in which the seller was experienced were used (i.e., seller experience was at least one standard deviation above the mean). As noted previously, item condition, seller reputation, total number of bids received, whether "Buy-It-Now" was used, and the starting bid were also included in each model as covariates.

RESULTS AND DISCUSSION

H1 posited that as buyer experience increases, the total cost incurred by the buyer in acquiring a commodity item in an online auction market would decrease. The results of the regression model testing this hypothesis are presented in Table 1.

Model R^2	$F_{(6, 8421)}$	Observed Power	Effect Size (f^2)
0.288***	567.065	0.999	0.404
***significant at $p < 0.001$			
Measure	Regression Coefficient	95% Confidence Interval	
		Lower Bound	Upper Bound
Item Condition	0.342***	0.303	0.381
Seller Reputation	0.037***	0.018	0.055
Number of Bids	0.554***	0.527	0.581
Buy-It-Now	-0.158***	-0.209	-0.108
Starting Bid	0.740***	0.711	0.768
Buyer Experience	**-0.036*** **	**-0.054**	**-0.018**
***significant at $p < 0.001$			

Table 1. Test of Hypothesis 1.

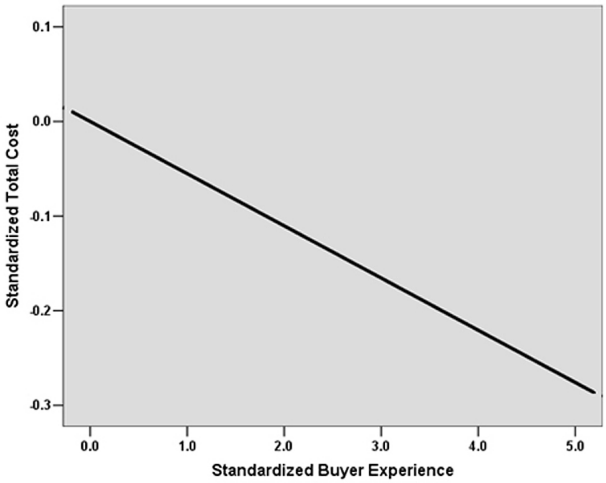

Figure 1. Test of Hypothesis 1.

After controlling for the covariates, buyer experience remained a significant predictor of the total cost incurred in acquiring a commodity item in the online auction market. The regression coefficient indicates an inverse relationship between buyer experience and total cost; H1 is therefore fully supported. For every one standard deviation increase in buyer experience, total cost decreases by 0.036 standard deviations. A buyer whose experience level is three standard deviations above the mean can therefore expect her total item acquisition costs to be 4.3% below average. This relationship is depicted in Figure 1.

H2 posited that as seller experience increases, the total revenue generated through the sale of a commodity item in an online auction market would increase. The results of the regression model testing this hypothesis are presented in Table 2.

Model R^2	$F_{(6, 8421)}$	Observed Power	Effect Size (f^2)
0.288***	567.087	0.999	0.404
***significant at $p < 0.001$			
Measure	Regression Coefficient	95% Confidence Interval	
		Lower Bound	Upper Bound
Item Condition	0.341***	0.302	0.380
Seller Reputation	0.037***	0.019	0.055
Number of Bids	0.556***	0.529	0.583
Buy-It-Now	-0.167***	-0.218	-0.116
Starting Bid	0.741***	0.712	0.770
Seller Experience	**0.036*** **	**0.018**	**0.054**
***significant at $p < 0.001$			

Table 2. Test of Hypothesis 2.

As shown in the table, seller experience remained a significant predictor of total revenue after controlling for the covariates. The positive regression coefficient indicates that as seller experience increases, so too does total revenue; H2 is therefore supported. For every one standard deviation increase in seller experience, the total revenue generated through the sale of a commodity item increases by 0.036 standard deviations. A seller whose experience level is three standard deviations above the mean can therefore expect to generate 4.3% more total revenue than average. This relationship is depicted in Figure 2.

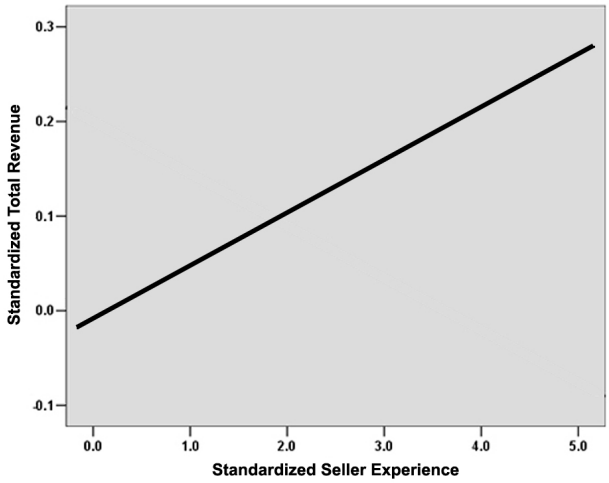

Figure 2. Test of Hypothesis 2.

As predicted by IPT, experience gained through interactions with the online auction market ultimately allows a novice participant to progress to an associative stage in which her factual, declarative knowledge of the market environment is supplanted by procedural, skill-based knowledge. Not only does this transformation lead to the resolution of initial errors of understanding, but it also results in the participant developing and refining heuristic-based strategies and tactics that yield superior decision-making abilities and improved financial outcomes.

H3 posited that experienced sellers would realize significantly greater financial gains through the sale of a commodity item in an online auction market when dealing with inexperienced buyers than with experienced buyers. The results of the regression model testing this hypothesis are presented in Table 3.

Model R^2	$F_{(6, 782)}$	Observed Power	Effect Size (f^2)
0.367***	75.457	0.999	0.579
***significant at $p < 0.001$			
Measure	Regression Coefficient	95% Confidence Interval	
		Lower Bound	Upper Bound
Item Condition	0.606***	0.468	0.745
Number of Bids	0.570***	0.479	0.660
Starting Bid	0.743***	0.662	0.824
Buyer Experience	0.092	-0.026	0.209
Seller Experience	0.034	-0.001	0.068
Interaction Term+	**-0.056***	**-0.106**	**0.006**
* significant at $p < 0.05$ ***significant at $p < 0.001$ + Interaction Term = Buyer Experience * Seller Experience *Note*: 'Seller Reputation' and 'Buy-It-Now' were not significant predictors, and were therefore excluded from the final model.			

Table 3. Test of Hypothesis 3.

The significant interaction term implies that the extent to which experienced sellers are able to generate above-average total revenue through the sale of a commodity item in an online auction market depends upon the experience of the buyer. A more in-depth analysis of this interaction effect is shown in Table 4.

Statistic	Low Buyer Experience (-1 Std Dev)	Average Buyer Experience	High Buyer Experience (+1 Std Dev)
Simple Slope	0.092	0.032	-0.025
Intercept	-0.056	0.044	0.137
Degrees of Freedom	782	782	782
t	3.365	3.153	-0.856
Significance (one-tailed)	< 0.001	< 0.001	not significant
95% Confidence Interval around the Simple Slope	0.039 to 0.146	0.012 to 0.051	-0.083 to 0.032

Table 4. In-depth Analysis of the H3 Interaction Effect.

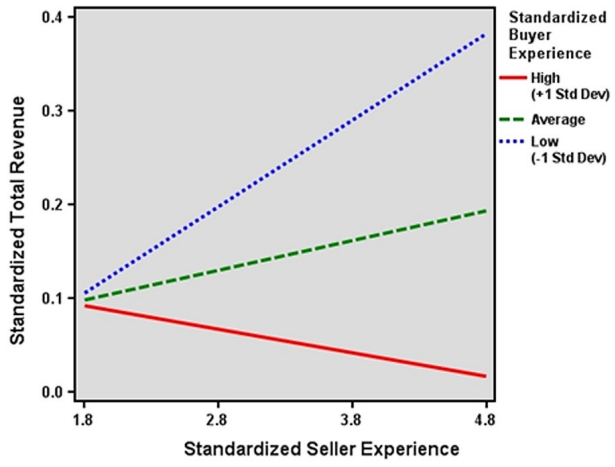

Figure 3. H3 Interaction Effect.

The interaction effect was found to be highly significant for buyers of low and average experience, but was not significant for highly experienced buyers; H3 is therefore supported. The simple slopes indicate that the impact of seller experience on total revenue among highly experienced sellers is nearly 300% greater when the buyer has low experience as opposed to average experience. This relationship is depicted in Figure 3.

IPT posits that experienced buyers in the associative stage will increasingly develop both an awareness of the strategies employed by experienced sellers to inflate total revenue and a more accurate sense of the average market price for their target item. Incorporating this knowledge into the decision-making process leads experienced buyers to participate in auctions with experienced sellers only when there is a financial benefit of doing so.

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

It is important to note that the work reported here is research in progress. While size constraints have precluded a more in-depth discussion of IPT and the current online market literature, the intent here has been to demonstrate that participant experience significantly impacts financial outcomes in electronic auction markets. The results indicate that both buyer and seller experience impact financial outcomes in online commodity auctions, and that they interact to affect those outcomes. Research examining electronic auction markets should therefore carefully consider the impact of participant experience on market outcomes. Future work in this area will use IPT to guide a more thorough investigation of the role of buyer and seller experience in online markets. It is hoped that this research stream will ultimately reveal knowledge about electronic markets that can be strategically utilized by managers to effect competitive advantage for their firms.

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