The Power of Collective Insight: Harnessing the Wisdom of the Crowd for Digital Auction Success

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Abstract

During the COVID-19 pandemic, online auction markets gained significant importance for their efficient and transparent handling of the shift in economic activity. Renowned digital car auction platform Bring a Trailer (BaT) experienced remarkable growth, with its revenue reaching $828 million in 2020. This study investigates the factors contributing to BaT's success, focusing on the role of its unique community comment feature, which leverages the collective intelligence of its users, known as wisdom of the crowd (WOC) in IS literature. Analyzing a dataset of 13,451 car listings, the study explores how WOC elements such as information quality and user identity impact auction performance. The analysis reveals that helpful WOC content positively influences auction outcomes, reducing information asymmetry and increasing market efficiency. The impact of WOC contributor reputations, however, showed less consistent results. These findings are relevant for stakeholders in the automotive market, providing insights to inform decision-making in online auction markets.

Keywords: Wisdom of the Crowd, Information Quality, User Identity, Online Auctions, Information Asymmetry

1. Introduction

The pandemic restrictions imposed in many countries during the first half of 2020 contributed to the significant shift of economic activity in online automotive auction markets. Bring a Trailer (BaT), one of the leading car auction platforms, more than doubled its revenue to $828 million in 2020. A recent analysis by Hagerty found out that many cars that remain unsold for months on traditional online marketplaces get sold on BaT in a matter of days with considerably higher premiums than the asking price. For example, vehicles going from a different venue to BaT within a year sold, on average, for 8 percent more on BaT than the previous sale price. And vehicles going from BaT to a different venue within a year sold, on average, for 20 percent less. This raises an important question: Why do people pay more on BaT? Traditionally, the drivers of higher premiums in online auction markets (in addition to the product characteristics, rarity, condition, etc.) have been attributed to institution-based trust or the buyer's perception that effective third-party institutional or platform mechanisms in place facilitate transaction success (Bockstedt & Goh, 2011). However, what differentiates BaT from other similar platforms is not the platform infrastructure and features alone, but its unique community of car enthusiasts who are genuinely interested in voicing their opinions and contributing their knowledge and expertise to the transaction process. In 2020 alone, BaT auctions garnered nearly two million comments and more than two hundred thousand new users to the site, doubling its userbase from the previous year. While the informational value of the collective opinion of a group, known as wisdom of the crowd (WOC), cannot be underestimated, the nature and consequences of its effects in the context of online auction platforms remains underexplored in the information systems (IS) literature.

From a theoretical perspective, we seek to answer the following broader research question: Does the informational value of WOC have the capacity to shape the performance of online auctions? WOC as a phenomenon can drastically improve the historical inefficiencies of auction-based markets by decreasing the information asymmetry created by the traditional one-way system of conducting auctions in real time. That is, by opening up the space for comments and opinions, both bidders and sellers get a chance to learn more about the product and make more informed decisions, which ultimately leads to greater market efficiency.

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From an empirical perspective, our research question can be framed as: What is the impact of WOC information quality and user identity on auction listing performance? To this end, we leverage a unique dataset of nearly 13,451 car listings matched across multiple sources of data that include BaT and VinAudit, a commercial service that supplies vehicle market evaluation. Since WOC acts as a double-edged sword capable of shaping the listings' performance in both directions, it is important to understand which factors and to what extent contribute to such changes.

The contribution of the study is threefold. First, we address the gap in the IS literature on the role of informational value enabled by WOC in online automotive auction markets by illustrating unique online environments where traditional auction signals intervene with real-time accumulation of user-generated content and have the capacity to actively shape performance. Second, we contribute to the WOC theory by elucidating the effects of content-related aspects of WOC on performance with respect to the roles of content contributors. Finally, our findings are of immediate interest for a diverse range of automotive market stakeholders including online platforms, sellers, and buyers.

2. Background

Bring a Trailer (BaT) identifies itself as "a digital auction platform and enthusiast community" that has been in the center of recent media attention with its record-breaking auction results. What differentiates BaT from other online auctions is the quality of the offered listings. To this end, although the vehicles do not undergo any formal expert evaluation, the platform curates all submitted vehicles and puts significant effort into crafting transparent auction listings that present the vehicles without superlatives or dubious used-car-lot language. What is even more important is the unique role of BaT's knowledgeable community (with more than 700,000 users and over 300,000 registered bidders) that vets each listing so that potential buyers can bid with confidence. In contrast to most other online car auctions that generally preclude user interaction, BaT offers a highly interactive online environment rich in engagement features and user roles.

Once the listing is made available, users and bidders can start their engagement with it; generally, auctions run for seven days. During the auction, the seller is encouraged to be an active participant in the communication process with users and bidders. Generally, many platform participants engage by voicing their opinions and engaging in conversations with the seller or other users. The range of topics revolving around the listing can include various aspects associated with the history, condition, service records, maintenance issues, color, specifications, price, ownership, and technical details of the vehicle, and questions and clarifications about the listing, among other topics.

Given the diverse backgrounds and experiences of active platform participants, each BaT listing accumulates a repository of unique knowledge pertaining to a given car (listing) that would not be available anywhere else. We argue that this unique knowledge, or wisdom of the crowd, has the capacity to provide additional value that is reflected in the listing's final price. That is, the WOC effect generated by the BaT audience is likely to contribute to the change in the difference between BaT price and average market value that the buyer would incur for quality cars.

3. Literature review

Wisdom of the crowd is a concept used to describe situations in which the aggregate opinion of a diverse group of people may be more reliable than that of an expert (Hertwig, 2012). Although not mentioning WOC by name, one of the precursors of WOC research in IS is the work of Ma and Agarwal (2007), who explore the antecedents of computer-mediated knowledge sharing and uncover the importance of perceived identity verification for online community member satisfaction and knowledge contribution. Later work from the same family of IS ideas further theorizes WOC aspects such as temporary crowds (Majchrzak & Malhotra, 2016), innovative idea generation (Aggarwal et al., 2021), the factors influencing knowledge sharing (Jin et al., 2021), and the role of WOC in the face of misinformation and deception (Mostagir et al., 2022).

Further, more recent work has started problematizing some of the assumptions of classical WOC which juxtaposes crowds and experts and has instead proposed a complementary way of leveraging the strengths of both parties rather than privileging the performance of non-expert crowds. Experts and members of the public working synergistically has been at the center of various online platforms, particularly crowdfunding (Mollick & Nanda, 2016). The overarching theme of this cluster of studies is prediction accuracy and the conditions associated with its optimal performance. The key problem in this kind of research is how investors can make optimal allocation decisions under information asymmetry but in the presence of informational cues from other platform users (experts and non-experts alike).

Another research stream revolves around electronic word-of-mouth (eWOM) communication (Kaminski et al., 2018). While mainstream eWOM research often focuses on information diffusion and the influence of eWOM artifacts such as online reviews on consumer behavior, in the context of WOC, the main outcome of interest becomes not so much what the recipient of collective wisdom does with the information they received but rather the value of the information itself (Lukyanenko et al., 2014).

Each of the described research areas has contributed a set of key dimensions to the study of WOC in IS. Yet, no prior WOC study has explored the foundational WOC facets together, despite the well-established finding in IS research that perceived identity verification and information quality are inextricably linked and jointly form the basis for communicative action in online spaces (Gao & Li, 2019). The resulting lacuna in the WOC literature points to the partial nature of our current understanding of the relationship between WOC and performance in online auction platforms. This is important because any oversight of the distinct yet related effects of information quality and the identity of its communicator can pose practical challenges.

4. Theoretical development

The process of consumer decision-making is complex and generally driven by a multitude of intrinsic and extrinsic factors (Bettman et al., 1991). When it comes to buying motorized vehicles, traditional in-person shopping provides more flexibility in terms of physical inspection and test drives, room for negotiation, avoiding scams, and trade-in options, to name a few. With online purchases, however, consumers are often limited to the information available to them through the platform itself, such as descriptions, photos, videos, and car history reports, and consumers must make a purchasing decision based on these affordances alone. To address this limitation and thereby more effectively reduce the information asymmetry between buyers and sellers, some platforms are now providing their users with the affordance of engaging with one another, for example, via exchanging comments. While some commenters are likely to bring genuine informational value based on their levels of knowledge and expertise, anecdotal evidence suggests that there are often misinformed commenters as well, contributing low quality information that has the capacity to sway auction results.[1] To this end, our study contributes to the literature by elucidating the effects of information quality and contributor identity on platform performance in the context of online auctions, thereby providing important insights regarding the informational dynamics of online marketplaces. It is important to emphasize that in exploring the effects of information quality and contributor identity separately, we do not imply complete independence of these constructs, which are commonly viewed as two dimensions of WOC (Lukyanenko et al., 2014). (The complex interrelationship between these factors is explored in the journal version of the study.)

Role of Information Quality. Online auction platforms constitute unique virtual spaces at the intersection of online communities and organizational networks. As such, they can be characterized as *social information systems* since they incorporate both open collaboration and social interaction affordances that jointly elevate the status of platform participants from mere users to voluntary prosumers that both consume and produce content (Tilly et al., 2016). Unlike offline communities, social information systems rely on computer-mediated communication, which complicates the process of assessing and verifying the social attributes of other platform participants (Ma & Agarwal, 2007). This process is crucial to user engagement since it helps establish trust in the platform and its community, which in turn increases the likelihood of a prosumer contributing to content creation (Moon & Sproull, 2008). To this end, the *quality* of the contributed content plays a pivotal role in determining the success of the system in the long run (Lukyanenko et al., 2014). Information quality is an important facet of user-generated content, which has often been theorized as either fitness for use of data by information consumers for specific purposes or as conformance to specification and as exceeding consumer expectations (Kahn et al., 2002). While it has long been established that information quality has a strong impact on organizational performance (Gorla et al., 2010), its multifaceted nature presents challenges for the theoretical and practical development of IS research (Chen & Tseng, 2011). To this end, our study advances past literature by studying the quality of WOC content from the perspective of its helpfulness (NOTE: In the journal version of the study, we expand the content quality aspects to include sentiment and amount of information).

A key dimension of information quality in the context of both WOC and eWOM is the helpfulness of the user-generated content, defined as the usefulness

[1]https://www.reddit.com/r/cars/comments/md86bf/unpopular_opinion_car_auction_sites_suck/

of user comments or reviews as perceived by other platform users and measured by the tools for evaluating content quality afforded by the platform such as rating stars or "thumbs up" (adapted from Mudambi & Schuff, 2010). Helpfulness has been shown to positively influence performance and its importance was first evaluated by Mudambi and Schuff (2010). Drawing from information economics theory, the authors demonstrate the importance of helpfulness in online purchasing platforms due to its role in mitigating information asymmetry. In particular, the perceived helpfulness of existing product reviews serves to reduce purchase uncertainty by conveying to potential buyers relevant product information that helps them to understand and evaluate the quality and performance of a given product sold online (Jiang & Benbasat, 2004). The significantly positive influence of helpfulness on performance has been found to hold across multiple dimensions of online platform performance, including eWOM adoption (Moradi & Zihagh, 2022) and new product sales (Topaloglu & Dass, 2019). We therefore hypothesize:

H1: WOC content helpfulness will positively impact the performance of online auctions.

Role of Identity in Collective Wisdom. Identity comprises a complex and multifaceted set of personal characteristics jointly informing the answers to the question of "Who am I?" Clearly communicating these answers to other platform participants becomes paramount for achieving a shared understanding (Ma & Agarwal, 2007). This process is no less important in online environments and has been associated with at least three facets of better virtual communication: effective identity communication helps knowledge seekers establish source credibility, find others with shared interests to build closer relationships with, and offsets potential discomfort and anxiety from unduly placed expectations by others when they do not identify the focal subject correctly (Ma & Agarwal, 2007). In the IS literature, this consensus has been theorized as *perceived identity verification* and is defined as the perceived confirmation from other community members of a focal person's belief about their identity (Ma & Agarwal, 2007). In the absence of embodied contact, computer-mediated communication regulates this process via technological features that offer ways to self-identify and help reduce attribution differences so that the sender and receiver can achieve a shared understanding (Ma & Agarwal, 2007). Compared to the physical world, in online communities a great deal of social and identity information can be communicated through a ranking system where a user can be rated by others based on their expertise, trustworthiness, contribution, or other criteria (Ma & Agarwal, 2007). The ability to disclose one's identity through the profiling features of online platforms has been shown to have a significant impact on performance in online environments. In the context of auctions and other types of electronic marketplaces specifically, Forman et al. (2008) demonstrate that disclosure of reviewer identity is associated with increased product sales. Similarly, Gregg and Walczak (2008) show a positive relationship between perceived online reputability and users' willingness to transact with the auction site, as well as higher auction prices. Despite the overall positive effect of reputability, a more nuanced view of the informational ecosystem of auction site discussion communities reveals a diverse composition of user roles. Two main types of users contributing to the discussion associated with a given listing include those capable of and actually placing bids and those who, while they voice their opinions, remain outside the actual bidding process and act merely as "opinion voicers." These differences can be captured theoretically using the concept of "faultlines," defined in the management literature as hypothetical divisions that create subgroups within a larger group based on the alignment of one or more individual attributes, leading to differences in group dynamics and performance (Lau & Murnighan, 1998). While research has explored the influence of faultlines on various aspects of group behavior, their role in shaping informational diversity within online auction contexts remains unexplored. (NOTE: In the journal version of the study, we expand this discussion and provide an accompanying empirical analysis accounting for these differences in contributor identity and their effect on auction performance).

Following this logical flow, we argue that the reputation of the WOC content contributor as a key indicator of perceived online reputability is likely to positively impact listing performance. Reputation in this context refers to the extent to which a content contributor is trusted or highly regarded and therefore has influence over users reading her contributions to the platform (Chen & Tseng, 2011). Specifically, reputation is defined as the "aggregated opinions about the contributor from others" and can influence "both cognitive and affective trust towards the reviewer" (Xu, 2014). It is foundational for performance because for potential buyers to trust the information related to a listing, they need to first trust its source (Xu, 2014). In cases where there is a limited history of prior interactions with a content contributor, resulting in unfamiliarity with their identity, reputation plays a vital role in mitigating uncertainty and facilitating trust assessment. By leveraging reputation as a crucial factor, decision-making processes can be informed,

ultimately leading to improved performance in such instances (Park et al., 2013; Xu, 2014). We therefore hypothesize:

H2: Higher reputation of WOC contributors will positively impact the performance of online auctions.

5. Methods

Data. Our data collection procedure was guided by the design implications of the BaT website. That is, past auctions' results can be displayed to the viewer using one of the following filters: most recent, oldest, highest priced, and most popular. For each of the filters, there are about 10,000 past listings available for public perusal. To construct our dataset, we first collected information for nearly 40,000 listings available for each of the filters. Given the expected potential overlap in the listings included in two or more filter categories, we excluded duplicate cars from the analysis using vehicle identification number (VIN) as a unique identifying code. The resulting sample included N = 13,451 listings with nearly 1.12 million individual user- and post-level data points that span August 21, 2014, to December 10, 2021. Additionally, a vital piece to our empirical analysis is the data behind the *market value* of a given car. These data were provided to us by VinAudit.com, an official provider of consolidated car history reports from a vast network of trusted and authoritative sources across the nation. Specifically, we used the platform's proprietary estimates of the retail value of any known VIN based on the price that similar vehicles across the United States have sold for in a time period consistent with the time of the auction.

Dependent Variable. It is generally known that most new cars depreciate or lose 10-20% of their value almost immediately after leaving the dealer's lot. Therefore, it is seldom that a used car can be sold for more than it was originally purchased for (except for vehicles that were able to develop collectable value). Yet, there are some individuals that tend to exhibit loss aversion behavior to minimizing the depreciation value of their vehicle by selling it at a higher price, preferably above the market value. To this end, there are generally three options available to the seller: (1) sell to dealership (directly or as a trade-in) – fast, low risk, assumed to offer below market value; (2) sell through some digital marketplace or Craigslist – can take time, requires some experience, assumed to offer close to market value or possibly higher; and (3) sell at auction – fixed time, experience needed, assumed to potentially offer the highest price exceeding market value. In case of an auction *with reserve*, the seller would set the minimum amount (undisclosed to bidders) that must be met for the auction to be successful. It is plausible to assume that this amount (unobserved to us) is likely to revolve around the market average assumed to be the baseline by the seller. Anything that would be "earned" on top of the baseline can be considered as gain or *profit*. Setting the reserve too high can negatively impact the chances of a successful auction. And in the case of an auction *without reserve*, the car would be sold to the highest bidder, i.e., the seller must agree to the final offered price. To this end, the outcome could be a double-edged sword for the seller as the final price can be considerably below market value, resulting in a *loss*. Based on the aforementioned elaborations, we measure listing *performance* by calculating the difference between the final BaT price of the listing and corresponding average market value of similar cars (VinAudit data). This is a widely used performance measure in online markets to denote financial returns, generally captured with the actual offer price less the expected offer price (Carter et al., 2012), or, in our case, the maximum bidding price less the expected offer price that would generally tend to revolve around average market value. Operationalization and descriptive statistics are presented in Table 1.

Independent Variables. We operationalize information quality using the *helpfulness score* of content (comments provided by BaT registered users) represented by the total number of votes cast by other users for a given comment. The minimum value for helpfulness is zero, as for unhelpful posts there is an option to flag those as "not constructive" (then the platform moderator will determine if the comment needs to be removed). This measure has been used extensively in past IS research (Mudambi & Schuff, 2010) and has been identified as a key predictor of several online platform outcomes, including sales (Lee & Choeh, 2018) and financial performance (Mariani & Borghi, 2020). Further, we operationalize identity verification using the user *reputation score* represented by the total number of helpfulness votes received by a given user for all their comments, following a well-established practice in the IS literature (Xu, 2014). This is a key measure of online marketplace performance in the IS research and its positive influence on sales has been validated repeatedly (Forman et al., 2008; Xu, 2014).

Model Specification. In the baseline specification, we estimate the following regression model:

Variable	Definition	N	Mean	SD	Min	Max
Performance Measures						
BaT price	BaT listing winning bid (in USD) or highest bid offered	13,451	57,653.70	76,203.18	1300	3,125,000
Average market price	Average price of comparable car at the time of sale based on nationwide purchase data (Vinaudit.com)	13,451	57,889.94	83,278	200	3,435,978
Performance	Difference between listing winning bid and average market price	13,451	-236.75	33,000.09	-779,214	488,939
Bid success	Indicator if vehicle was *sold* or *not*. In some instances, if the minimum *reserve* on the car is not met, it remains with owner	13,451	.82	.37	0	1
WOC Information Quality						
Helpfulness	Total number of "thumbs up" votes cast by users for a comment in a given listing	1,010,350	1.15	1.49	0	119
WOC Identity Verification						
User reputation	Total number of "thumbs up" votes cast by users for a focal user's comments (displayed next to username for each comment)	1,001,386	2004	5301	0	56,355
Other WOC content characteristics (controls)						
Number of comments	Total number of comments for a BaT listing	13,451	84.56	58.72	20	1683
Question	Indicator if comment in a given listing is a question	1,010,350	.18	.38	0	1
Reply	Indicator if comment in a given listing is a reply	1,010,350	.30	.46	0	1
Car features (controls)						
Year	Reported year of manufacturing	13,451	1999	9.98	1955	2021
Mileage	Vehicle's reported mileage	12,811	57,573	54,371	0	553,000
Clean CARFAX	Indicator if car has a "clean" (accident-free) CARFAX report	13,451	.64	.47	0	1
Listing features (controls)						
No reserve	Indicator if listing has a minimum price set at which it will be sold	13,451	.18	.38	0	1
Bid number	Total number of bids	13,451	26.59	12.47	1	106
Photos	Total number of photos in the listing	13,451	105	65	10	770
Videos	Total number of videos in the listing	13,451	.72	1.52	0	29

Table 1. Variable operationalization and descriptive statistics

$$y_i = a + \beta_1 Helpfulness_i + \beta_2 Reputation_i + \beta_3 Number\ of\ comments_i + \beta_4 Question_i + \beta_5 Reply_i + \beta_6 Link_{ijt} + \beta_7 Year_i + \beta_8 Mileage_i + \beta_9 Clean\ CARFAX_i + \beta_{10} No\ reserve_i + \beta_{11} Total\ bids_i + \beta_{12} Total\ photos_i + \beta_{13} Total\ videos_i + Brand_i + Year_t + Day\ of\ week_t + \epsilon_i$$

In the equation, the outcome y_i represents the *performance* measure for listing i calculated as the difference between the BaT price (highest or winning bid) and the average market price for a similar vehicle. Using such an approach alleviates some endogeneity concerns and ensures correct identification of the WOC effect. It also facilities the interpretation of the observed effects, such that a positive coefficient is indicative of profit (and its magnitude) and a negative one of loss.

Additionally, to provide deeper insights, we use three alternative outcome measures, namely, *BaT price* (winning or highest bid), *market average price*, and an auction listing *success* indicator that captures if the listing was sold or the reserve price was not met. The independent variables $Helpfulness_i$ and $Reputation_i$ aggregated at means by listing correspond to Hypotheses 1 and 2, respectively. The rest of the covariates in the model correspond to a variety of time-variant and static effects used as

controls. These control variables are discussed in the next section. Finally, a is a constant term, and ϵ_i denotes the idiosyncratic error term.

Alternate Explanations. We have taken several steps to address alternative theoretical explanations that may trigger changes in the online auction performance. *First*, it is conceivable that a higher frequency of comments might influence the frequency of engagement, and this may be associated with greater variations in listings' performance. We therefore control for the total $Number\ of\ comments_i$ for each listing. *Second*, user-generated posts to listings are not homogenous in nature and certain types could sometimes harm rather than benefit a listing (Estrella-Ramón & Ellis-Chadwick, 2017). Posts containing a question usually are more likely to attract a reply (Crook & Love, 2016), which could potentially boost the engagement and visibility of the listing and hence lead to more bids. Conversely, if a listing is associated with many questions, this might be an indicator of underlying issues with the listed product or higher uncertainty among bidders, which could decrease the probability of listing success. Another way of distinguishing between different types of user-generated content in online auctions is to consider the difference between primary and supplementary content. While the former captures initial user-contributed information, the latter reflects further deliberations by commenters or seller replies to user feedback (Wang et al., 2021). To account for these alternative explanations, we include $Question_{ijt}$ and $Reply_{ijt}$ indicator variables to capture the proportion of question-containing posts and supplementary content posts associated with a listing. *Third*, generally, newer used vehicles cost more than older ones, as they usually have less wear and tear. Correspondingly, used cars with lower mileage usually cost more than those with higher mileage. We therefore include $Year_i$ and $Mileage_i$ controls, following past IS research (Dimoka et al., 2012). *Fourth*, the CARFAX report is an important step in the quality assessment of used cars (Dimoka et al., 2012). With CARFAX, buyers can easily obtain a good overview of the car's ownership, history of repairs, and collisions, if any. We account for this in our model by including a $Clean\ CARFAX_i$ indicator. *Fifth*, the success of the auction and its associated performance depends majorly on whether there is a minimum price set by the seller at which it will be sold. The IS literature consistently demonstrates that auctions without reserves tend to attract higher bidder participation and consequently have a higher probability of success, highlighting the direct impact of auction type on outcomes (Anthony & Law, 2012). We therefore account for the auction type by including the $No\ reserve_i$ indicator. *Sixth*, according to the theory of herd behavior bias in online auctions, listings with multiple bids will likely attract more bids, whereas unbid-for listings may be foregone by potential bidders even if they are more attractive than those with active bidders (Dholakia & Soltysinski, 2001). Prior literature indicated that the total number of bids is directly related to bid performance, and particularly to a higher winning bid (Stern & Stafford, 2006). We therefore include $Total\ bids_i$ for listing i as a covariate. *Seventh*, given the limited possibility to assess the car in-person, photos and videos of the vehicle become important sources of information for the interested platform users as they act as quality indicators for the listed product. In the online auction literature, photo displays embedded in the auction listing have been found to be associated with a significant increase in the number of bids (Bockstedt & Goh, 2011). To account for potential variations in performance, we add $Total\ photos_i$ and $Total\ videos_i$ as control covariates. *Eight*, Gallup research[2] points to the pivotal role of the connection between a customer and a brand. The study found that brand relationships are not simply rationally driven or logically grounded but are also emotional. Moreover, there is heterogeneity in the car brands' own strategies in marketing their products and engaging with the stakeholders. Since customer brand engagement positively influences brand loyalty (Zaidun et al., 2021), it is plausible to expect significant difference in the listing performance of cars of different brands. To rule out these effects, we include $Brand_i$ dummies in our model. Lastly, to account for temporal variations, we include $Year_t$ and $Day\ of\ week_t$ indicators in the model.

Results. In Table 2 we present the regression analysis result for the main outcome of interest, *performance*, and several alternative outcomes. Comprehensive descriptions of the variables used, including all covariates, can be found in Table 1. Supporting Hypothesis 1, we consistently observe statistical significance in the beta coefficient for helpfulness across Models 1-3. On average, for every 1-point increase in the helpfulness score, we observe a corresponding increase of $158.3 in the performance measure ($p < .001$). In other words, when users find the content within the Wisdom of the Crowd (WOC) helpful, it tends to lead to a positive increase in the difference between market average and BaT prices,

[2] https://news.gallup.com/businessjournal/13606/why-car-buyers-buy.aspx

resulting in higher earnings. Furthermore, Models 4-6 reveal that, on average, helpfulness is negatively correlated with alternative outcome measures. This suggests that when users perceive WOC content as helpful, it often indicates that the content has brought attention to certain shortcomings or issues with the listing, consequently leading to a lower monetary evaluation.

In contrast, we find fragmentary evidence of the reputation effect on performance, which seems to be notable only in the case of auctions with a no reserve ($p < .05$) (Model 3). The magnitude of the observed effect is admittedly very small. While user reputation indicates positive correlations with alternative outcomes (Models 4-5), it fails to consistently influence the change in the difference attributed to the WoC effect. Therefore, *Hypothesis 2* is not supported. Overall, our results provide suggestive evidence of the substantial importance of the quality of WoC information in shaping auction outcomes, whereas the identity of the contributor with respect to their reputation does not seem to play a major role.

Robustness Checks. Despite our efforts to address possible endogeneity concerns, we acknowledge that our results remain subject to omitted variable bias and self-selection. One particularly important unobserved variable that can influence both WOC and auction performance is the seller's strategy, which is only partially revealed to auction platform users through the seller's decision to auction a vehicle with or without reserve (see the discussion of the dependent variable in Section 5 for more information). While the choice between an auction with or without reserve (for which our models control) can conceivably influence auction outcomes, our analysis shows that there are no significant differences in the WOC factors associated with these two different kinds of auctions. Furthermore, we have strategically implemented an instrumental variable approach to mitigate these concerns. Building on past literature, we used two instrumental variables represented by two indicator variables if a listing was offered with delivery option and if a listing contained a pre-purchase inspection report provided by a third-party agency (Bockstedt & Goh, 2011). Our initial results suggested moderate correlation of the instruments with the endogenous independent variables and weak correlation with the outcome. We then subjected these instruments to a battery of weak-IV tests, the results of which are summarized in Table 3 and provide suggestive evidence in favor of the validity of the selected instruments and, therefore, the plausibility of our endogeneity correction strategy.

Table 2. Regression analysis results (robust SE)

Model/ Variable	(1) Perf. (Δ$)[3]	(2) Reserve Perf. (Δ$)	(3) No reserve Perf. (Δ$)	(4) BaT price ($)	(5) Market price ($)	(6) Success (1/0)
Helpfulness	158.30***	162.24***	54.81**	–459.74***	–618.04***	–0.007***
	(24.65)	(28.21)	(20.12)	(64.87)	(77.69)	(0.0008)
Reputation	0.01	–0.01	0.02*	0.38***	0.38***	0.00001
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.00001)
Controls	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Constant	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Car brand FE	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Year FE	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Day of week FE	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
N(listings)	*13,451*	*10,951*	*2,500*	*13,451*	*13,451*	*13,451*
R^2	*0.17*	*0.18*	*0.20*	*0.45*	*0.37*	*0.09*

Table 3. Weak instrumental variable identification tests

Test/IV	Anderson under-identification test	Stock-Yogo weak-identification test (5%)	Sargan over-identification test	Davidson-MacKinnon test
Delivery	$p < .01$	278.4	$p > .10$	$p > .10$
Pre-purchase inspection	$p < .01$	781.2	$p > .05$	$p > .10$

Furthermore, to address self-selection bias, we used coarsened-exact matching. Ensuring correct identification of the focal effects constitutes ongoing work and, at the time of this submission, provided suggestive evidence that the estimated effects are consistent.

[3] Performance denotes the difference between the BaT price and the average market price (represented by the VinAudit value). This measure captures the extent to which the BaT price, whether it results in a successful transaction or not, diverges from the average market value. For instance, if an individual lists a rare vehicle with an average market value of $50,000, receives a highest bid of $90,000, but the reserve price was set at $100,000, the car may not be categorized as "sold."

6. Discussion and conclusion

Our results show a significantly positive association between WOC content helpfulness and auction performance. This result is consistent with the extant IS theory, which highlights the crucial role of information quality in online consumer decision-making (Kahn et al., 2002). In online marketplaces, helpful information from other users aids potential buyers in enhancing their understanding and evaluation of the product, thereby reducing purchase uncertainty and facilitating informed decision-making (Jiang & Benbasat, 2004; Mudambi & Schuff, 2010). Similarly, with online car auctions, the easily accessible availability of helpful WOC content can ignite or stimulate the interest of a buyer to engage with an auction, for instance, by placing a bid, which in turn positively impacts the auction's performance.

The WOC dimension of contributor identity operationalized here as commenter reputation, on the other hand, was not found to be a significant predictor of online auction performance. This result was somewhat unexpected given that previous studies have highlighted the importance of online reputation in influencing users' behavior and decisions in online transactions (Park et al., 2013). This could be due to the impersonal nature of online auctions, where online user exchanges involve sharing information with a multitude of participants without necessarily developing a bond of trust or appreciation with any specific commenter (Ren et al., 2007), potentially leading to user reputation being discounted. Additionally, long-term WOC contributors would naturally accumulate higher reputation scores, while newer members, though helpful in the few instances they have contributed to, may still have relatively low scores. It is plausible that auction participants are aware of this natural variation and therefore place greater emphasis on the helpfulness of an individual comment rather than the reputation of the user associated with it. Nevertheless, the potential influence of the identity of WOC contributors, of which reputation is only one aspect, under different circumstances should not be easily dismissed. The complexity of online auction platforms' WOC calls for further exploration to gain a deeper understanding of other identity factors contributing to auction success.

In conclusion, our findings demonstrate the importance of WOC information quality for improved auction performance and point to the need for further research on WOC identity. Platform administrators and sellers can leverage our findings to foster an environment conducive to helpful and high-quality information exchanges that positively impact auction performance. This research is not without limitations; despite our best efforts, our analysis remains subject to potential omitted variable bias and self-selection. While this study offers valuable insights into the factors influencing auction listing performance, the utilization of a panel longitudinal dataset that captures intra-listing dynamics, including changes in bid increments over the course of an auction, could provide a more nuanced perspective on auction performance. Such a dataset would also help circumvent the challenge posed by the current model, where the dependent variable is recorded at the listing level while the independent variables are aggregated as means for each listing. Future research can further examine the nuanced impacts of WOC facets and their interplay on online auction performance, especially when it comes to various aspects of information quality, given the robust influence of one of its factors, helpfulness, demonstrated here. (Additional outcome measures such as number of bids per listing are considered in the journal version of the study.) This study lays a strong foundation for such future explorations.

7. References

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