E-LOYALTY TO ONLINE AUCTION WEBSITES: A STIMULUS-ORGANISM-RESPONSE MODEL

Xiling Cui, Hong Kong Shue Yan University, Hong Kong, xlcui@hksyu.edu
Vincent S. Lai, the Chinese University of Hong Kong, Hong Kong, vslai@cuhk.edu.hk

Abstract

Research on online auctions has attracted much attention from both practitioners and academicians. This paper aims to apply stimulus-organism-response (S-O-R) paradigm to construct the model of e-loyalty of online auction websites. Technology effectiveness, network effect, and product diversity are determinants proposed to influence customers’ brand perceptions, which in turn, affect e-loyalty. Empirical analysis shows that e-loyalty to an online auction website is significantly influenced by the factors proposed.

Keywords: E-loyalty, online auction, S-O-R.
1 INTRODUCTION

Online auction, one of the most popular e-commerce businesses, has attracted much appeal of information systems (IS) researchers. In the past, research efforts have been devoted to the investigations of auction mechanism (Carare & Rothkopf 2005; Ding et al. 2005; Roth & Ockenfels 2002; Spann et al. 2004; Terwiesch et al. 2005), bidding behavior (Ariely et al. 2005; Bapna et al. 2003, 2000, 2004; Brint 2003), etc. However, most of them were performed from a technology perspective and considered online auction a newly-emerged technology, though. Its role has gradually changed.

“IT fusion” is a concept that proposes the integration of information technologies (IT) into business and treats IT as front stage services rather than back office technology. With this perspective, online auctions can be treated as a business service to provide consumers an experience to bid products in the websites. Hence, customers’ loyalty to continue buying from online websites (called e-loyalty in this study) becomes more and more important. Previous research have confirmed the importance of loyalty to a website -- retaining existing consumers is less costly and difficult than obtaining new ones (Holland & Baker 2001), increasing customer retention rates by 5%, profits by 25% to 95% (Reichheld & Schefter 2000), sustaining competitive advantage (Gommans et al. 2001). As such, investigating the factors that increase e-loyalty to an online auction website from both technology and brand perspective becomes important.

The main objective of this research is thus to identify determinants of customers’ e-loyalty to an online auction website. In the exploration of this research objective, a research model based on the stimulus-organism-response (S-O-R) is constructed. In this model the effectiveness of technological services, product diversity, and website network effect are investigated as the stimuli. The psychological perceptions (both utilitarian and hedonic) on the websites are considered as the cognitive and affective statues of organisms (customers). It is believed that organisms will mediate the effect of stimuli on e-loyalty response. Data collected from real online auction bidders were analyzed to validate our S-O-R research model and hypotheses. This study contributes to e-commerce research by the investigation of the determinants of e-loyalty and the successful application of S-O-R paradigm. This paper is organized as follow. Section 2 introduces the research background of this study and prior studies on e-loyalty and stimulus-organism-response (S-O-R) paradigm. Section 3 proposes our research model derived from the literature. Section 4 introduces our methodology, followed by our data analysis results in Section 5. Section 6 discusses the results and implications of our research. The last section addresses conclusion and future research.

2 RESEARCH BACKGROUND

2.1 Studies on e-loyalty to websites

Previous studies on e-loyalty have investigated customer loyalty of B2B and B2C website, including online shops (Anderson & Srinivasan 2003; Semeijn et al. 2005; Srinivasan et al. 2002), portal site (van Riel et al. 2001), hotel-owned website (Miller 2005), and internet banking (Salmen & Muir 2003). Customer loyalty is a buyer's overall attachment or deep commitment to a product, service, brand, or organization (Oliver 1999). Researcher called the customer loyalty to a website “e-loyalty” or “online loyalty”, referring to the perceived intention to visit or use a website in the future and to consider purchasing from it in the future (Cyr 2008). It is believed that loyalty is of importance to e-commerce website as a central theme in establishing sustainable competitive advantage (Gommans et al. 2001). Research findings also revealed that e-loyalty has an impact on two customer-related outcomes: word-of-mouth promotion and willingness to pay more (Srinivasan et al. 2002).

In principle, e-loyalty factors can be classified into three categories: technological, personal, and social. Technologically, Gommans et al. (2001) believed that website & technology is one of the major underlying drivers of e-loyalty. For example, eCRM system can help create customer e-loyalty to internet banking (Salmen & Muir 2003). A proprietary website of lodging brand can help attract,
satisfy, and ultimately retain loyal e-consumers (Miller 2005). Technology use can also enhance e-loyalty in the areas of customerization, contact interactivity, care, community, cultivation, choice, character (Srinivasan et al. 2002).

Of all technological factors, Dahlen et al. (2003) found that website design has impact on a brand-related communication. User interface was found very important to customer loyalty to online portal websites (van Riel et al. 2001). Navigation, accuracy, responsiveness and assurance were also found to have effect on the overall satisfaction and e-loyalty (Semeijn et al. 2005). Research also indicated that perceived usability of the website has impact on trust and user satisfaction and then on the user’s loyalty to websites (Flavián et al. 2006).

In addition to technological factors, personal factors are also important to customer loyalty. Van Riel et al. found a strong positive effect of customer satisfaction on their intention to continue using the portal (van Riel et al. 2001). Semeijn et al. (2005) found online/offline value and joy determinates the overall satisfaction, which in turns to loyalty. Researchers also found customer value (service quality and price attribute) has an effect on customer loyalty, as mediated by customer satisfaction (Lam et al. 2004).

Though customer satisfaction is identified to be a necessary step to loyalty formation, this correlation gradually becomes less significant when loyalty begins to set through other mechanisms, such as personal fortitude and social bonding at the institutional and personal level (Oliver 1999). Besides, the effect of satisfaction on customer loyalty can also be moderated by consumers’ factors (convenience motivation, purchase size, and inertia) and firms’ factors (trust and perceived value). Of all social factors investigated, trust and security are believed to drive e-loyalty (Gommans et al. 2001). Social presence is also confirmed to have direct and indirect effect (through perceived usefulness, trust and enjoyment) on e-loyalty (Cyr et al. 2007).

2.2 Studies on stimulus-organism-response (S-O-R) paradigm

Stimulus-organism-response (S-O-R) paradigm was proposed by Mehrabian and Russell in 1974. The paradigm posits that stimuli from environments affect an individual’s cognitive and affective reactions, which in turn lead to some behaviour (Mehrabian & Russell 1974). This paradigm has been widely applied to consumer behavior studies. In this section, only relevant studies in recent decade are reviewed.

The S-O-R paradigm has been used to investigate shopping outcomes of online stores. The atmospheric cues work as the stimuli that influence shoppers’ emotional and cognitive states, and then lead to the response -- the approach/avoidance behavior (Eroglu et al. 2003). A similar model (also based on the S-O-R) was constructed recently to examine the effects of web atmospheric cues on users’ emotional responses on their purchasing intentions in e-commerce. It is found that vividness and interactivity have significant positive effects on users’ valence and arousal rates (Sheng & Joqinapelly 2012).

The paradigm has also been used to build a research model to investigate the relationships between relational bonds, customer value, and customer loyalty in the retail banking industry. In this model, relational bonds work is treated as the environmental stimuli, whereas customer values, including utilitarian and hedonic values, are used as the cognitive and affective states of the organism. Customer loyalty is their response to the stimuli. Empirical data from Taiwan confirmed the proposed model (Chiu et al. 2005).

The S-O-R paradigm has also been applied to investigate the behavior of ‘urge to buy impulsively’ (as the response of consumers)In this study, the task relevant and mood-relevant cues are representing the stimuli from the website; and perceived usefulness and perceived enjoyment are the organism’s cognitive and affective statues (Parboteeeah et al. 2009).

Besides the online or physical stores/industries, S-O-R has also been applied to investigate the purchase behavior of high-tech product. The findings suggest that stimuli such as innovativeness of technology, visual appeal, prototypicality, and self-expression have major influences on behaviour, as mediated by attitude (cognitive state) and pleasure (affective state) (Lee et al. 2011).
S-O-R has also been modified for different research objectives. For example, some researchers only focus on the S-R relationship to investigate the store image and the consumer retail behavior. The results showed that merchandising, accessibility, reputation, in-store service and atmosphere of the stores determines the consumers’ preference for the stores (Thang & Tan 2003). A few studies were found to have moderators added in their models when applying S-O-R. For example, when studying the relationship between atmospheric cues of online stores and behavioural intention, as mediated by affective emotional states of consumers, researchers introduced a moderator, perceptual curiosity, in the model (Koo & Ju 2010). Another study to investigate the relationship between retail environment characteristics, consumers' positive emotional responses, and impulse buying behavior also introduced hedonic motivation as the moderator between the characteristics and consumers’ positive emotional responses (Chang et al. 2011).

Our literature review suggests that there have been many studies applying S-O-R paradigms. Actually, a meta-analysis aggregating empirical findings from S-O-R paradigm was conducted recently. This study confirms emotion to be a critical organism factor. This study also finds arousal and pleasure to be responsible for much variation in hedonic and utilitarian motivation for shopping in 28 studies, indicating the validity of the S-O-R paradigm in explaining consumer shopping behavior (Vieira 2012).

3 MODEL AND HYPOTHESIS DEVELOPMENT

This research aims to explore e-loyalty to online auction websites. Stimulus-organism-response (S-O-R) paradigm is applied to construct the research model. According to the paradigm, environmental cues act as stimuli to affect an individual’s cognitive and affective reactions, which in turn affect behaviour (Mehrabian & Russell 1980). When applying this paradigm to this specific study, the authors are also aware that some adjustments are necessary. For example, it is believed that not all the stimuli have consequential effects on all the reactions. Therefore, only those that do are depicted in the model. There are also some interactions between individuals’ reactions (cognitive and affective), which then will be indicated in the research model.

In this study, the e-loyalty to online auction website works as a response in the paradigm. Factors (including technological, personal and social ones) are introduced as the stimulus clues and organism reactions. Due to the dual effect (both technology and brand) of online auctions, the factors will be examined from a technology or brand perspective. First, in order to determine the major technological services that involve in online bidding, a deep interview with 25 experienced online bidders was conducted. Two specific relevant technological services, bidding agent and “watch the item” (WTI) are discovered in the interview and selected to be investigated in the research model. In addition, as a public technology to all users, online auction website also has the effect of all the other public goods, network effect. This social effect should also be included in the model. From a brand perspective, diversified products provided by one online auction website build part of its images. Therefore, product diversity is necessary to be investigated in this study. The customers’ personal perceptions of the website brand (both utilitarian and hedonic) are the other two major factors that may influence their e-loyalty.

The factors are integrated by the stimulus-organism-response (S-O-R) paradigm to construct the research model indicated by Figure 1. In the model, technology effectiveness (including effectiveness of bidding agent and WTI), network effect, and product diversity work as the stimuli that influence the organism’ reactions (customer’s brand perceptions on the website). The utilitarian and hedonic perception on online auction websites, representing cognitive and affective reactions respectively, in turn influence the response part, customers’ e-loyalty to the website. The detailed hypotheses will be presented one by one, from the right to the left.
3.1 Customer perceptions and e-loyalty

When online auction websites are considered as a new technology, three types of perceptions were usually investigated, perceived ease of use, perceived usefulness and perceived enjoyment, as the major determinants in technology acceptance model (Davis et al. 1992). However, with the diffusion of internet and the standardization of the technologies, people become so familiar with the technology in online auction websites. Relatively, the ease of use is less and less a concern. Whether one website is useful or enjoyable begins to dominate the customers’ decision and behavior.

This is coincident with the research findings in brand studies. Two perceptions of customers, utilitarian and hedonic perception on one brand, were believed to have influence on customers’ purchase behavior (Na et al. 2007). As we discussed in the previous sections, online auction websites do not only play a pure technological role. Their brand effect begins to show up. Therefore, the two major perceptions, utilitarian and hedonic perception, are necessary to be investigated.

In the S-O-R paradigm, the part “O” usually consists of both cognitive and affective reactions. Previous study treated perceived usefulness as cognitive reaction while perceived enjoyment as affective reaction (Parboteeah et al. 2009). Therefore, in this study, utilitarian perception indicates the customers’ cognition of one website while hedonic one belongs to their affect.

Utilitarian perception on a website refers to customers’ perception on the utility of one website. It is believed critical to e-loyalty. Previous research proved the effect of some similar variables. For example, the utilitarian variable, perceived effectiveness is positively associated with the intention to use of technologies in TAM (Davis et al. 1992). Perceived website competence was also investigated as one dimension of trust and the researchers found it has a positive influence on website loyalty (Flavián et al. 2006). Luarn et al. believed perceived value, as the perceived e-service utility, have positive effect on customer loyalty and commitment (Luarn & Lin 2003).

Researchers found that utilitarian perception plays a paramount role in the purchase behavior of second-tier brand (Na et al. 2007). Online auction websites is like a second-tier brand which needs to attract a critical mass of buyers to get its network effect. It is thus believed to influence customers’ behavior and their e-loyalty. Based on these, we draw hypothesis:
**H1a:** Utilitarian perception is positively associated with e-loyalty to an online auction website.

Hedonic perception on a website refers to the enjoyment customers’ perceive of one website. Like utilitarian factors, hedonic factors are also important in previous research. Perceived enjoyment of the technology is later introduced into TAM and play a more and more important role in it (Van der Heijden 2004). The fulfillment to customers’ online joy determinates the overall satisfaction, which in turns to the loyalty to online shops (Semeijn et al. 2005). Hedonic perception has been investigated as a proxy of brand evaluation and it has a positive influence on consumers’ satisfaction of the brand, which in turn, influences their purchase intention (Na et al. 2007). In addition, consumers’ hedonic perception on one brand will enhance repurchase intention of the products with that brand (Na et al. 2007), increasing customer loyalty. We, therefore, believe that the same rationale exists for online auction websites. Customers’ hedonic perception will enhance their revisit intention of the website, increasing their e-loyalty to it. Therefore, we propose:

**H1b:** Hedonic perception is positively associated with e-loyalty to an online auction website.

In addition to their individual effect on e-loyalty, customers’ cognitive and affective perception may also have interaction. Empirical support of the causal relationship from cognition to affect has been found (Parboteeah et al. 2009), and for the reversed relationship as well (Venkatesh 2000). It is speculated that the causal direction between these two variables is determined by the dominant mediating state (either cognitive or affective) in the given context (Parboteeah et al. 2009).

In the context of online auction websites, it is also believed that people’s perceptions are not isolated. In addition, people have different levels of needs, the basic need on the utility of the websites, and then the upper level need on enjoyment, based on people’s hierarchical needs (Maslow 1943). Therefore, the utilitarian function of one website and then its entertaining characteristics are considered. The former perception may influence the latter one and then they influence the customers’ e-loyalty together. In the current study, the dominant mediating state was believed to be affect, which means cognition has an influence on affect first. The more utility customers perceive in an online auction website, the more fun they may feel of the same website. Therefore,

**H1c:** Utilitarian perception is positively associated with hedonic perception.

### 3.2 Technological services

Online auction website involves many technologies. It is not realistic to investigate all of them. Inspired by Pavlou et al. (2004) who focused on some major technological services in their study, we tried to figure out the important and unique technologies in online auction websites. Based on a deep interview with online bidders, two technological services relevant to bidding process, the bidding agent and the “watch the item” (WTI), were chosen. Bidding agent can automatically respond to others’ bids by bidding step by step until winning the auction or passing over the reservation price set in advance.

Bidding agent helps online bidders when they participate in auctions. But before they get into any auctions they are interested in, the function of “watch the item” can help to watch them even if they have not really participated. Many items can be watched at the same time. Bidders do not have to check the original WebPages one by one. It automatically sends messages to potential bidders with the updated progress of each auction.

According to our interview, both of the technological services are important to the respondents. Their effectiveness directly affects bidders’ bidding performance rather than other services. Like the website navigation and accuracy that are found to impact the perceived online value of the customers (Semeijn et al. 2005), these environmental stimuli provided by auction websites, are believed to influence the customers’ perception. Because the effectiveness of the technological services emphasizes on the utilitarian aspect, we believe their stimuli mainly lead to bidders’ utilitarian perception, rather than their hedonic perception (it is believed that not all the stimuli have consequential effects on all the reactions.). Therefore, two hypotheses were proposed:

**H2a:** Effectiveness of bidding agent is positively associated with utilitarian perception.
3.3 Network effect

Online auction websites provide an efficient platform for product information change and price formation. This new technology works more like a public product (like the telephone network) with the property of network effect— the “consumption” of a website by one user does not reduce its availability for the “consumption” by others (assuming there is no communication jam online). In addition, the utility of one online auction website will grow as its users grow. Complementary products/services can be found much easier as the network grows with more users. This is the economical phenomenon called “network effect” (or “network externality”). The network effect of online auction websites will facilitate them to become ‘branded’ ones for popularity and wide acceptance. For example, eBay attracted more users’ favorite because it has the largest number of users (Cameron & Galloway 2005).

Therefore, network effect is another important stimulus to customers to influence their perceptions. Previous research has found network effect significantly influence people’s behavior. For example, it is a significant driver of the adoption of open-standard interorganizational systems (Zhu et al. 2006). Cheng et al. (2007) empirically confirmed that the network effect can deter the mobile telecommunication users’ from switching to another carrier in the future. It is indicated in a simulation that network effect can increase the individual adoption of mobile commerce (Beck et al. 2008).

Based on the S-O-R diagram, before actual behavior (response), individuals’ cognitive/affective reactions must have been caused first. In this case, it is the customers’ perceptions on one website that caused by network effect. The network effect relates to the increasing utility of online auction websites, it is believed it may impact the customers’ utilitarian perception. The utility is increased as the user number increases due to network effect and customers will perceive more utility in the website. Therefore,

H3a: Network effect is positively associated with utilitarian perception.

It is also believed that network effect has some effect on customers’ hedonic perception. People are social creatures and they need to interact with each others. Researchers have found social presence of other bidders affects one customer’s behavior (Rafaeli & Noy 2005). Another study found social presence can influence e-loyalty through perceived usefulness, trust and enjoyment in a B2C e-Services (Cyr et al. 2007). With network effect, the increasing customer number brings more interaction, competition, or cooperation among them, as well as more fun. In addition, network effect can also bring customers a feeling of social cognition. High level of network effect also indicates a good reputation of the website. Customers in such a website are proud of being involved, which obviously increases their hedonic perception as well. Therefore,

H3b: Network effect is positively associated with hedonic perception.

3.4 Product diversity

One unique characteristic of an online auction website is that it can offer a wide variety of auctioned products, some of which are rare to see in traditional market. Product diversity, a concept adapted from organizational strategy studies is applied in this study. In organizations, product diversity is found significantly related to firm performance, not matter for large companies (Alesón & Escuer 2002; Tallman & Li 1996) or small- and medium-sized firms (Qian 2002). In this study, product diversity is also believed important to online auction websites. It has been suggested as a critical component for auction intermediaries to establish site brand (Wang et al. 2002).

On one hand, greater diversity can bring more convenience and options to online bidders, which increases their utilitarian perception on the auction website; on the other hand, higher diversity may also lead to more searches, comparison, and higher competition among products (Anderson & Renault 1999), which may increase the interest of bidding online. Therefore, we draw two hypotheses:
**H4a:** Product diversity is positively associated with utilitarian perception.

**H4b:** Product diversity is positively associated with hedonic perception.

## 4 METHODOLOGY

### 4.1 Measurement Development

Most of the measurements employed in this study were developed from previous literature. The review process allowed the research variables to contain a certain basis for measurement development and reliability assurance. All the measures are composed of multi-statements in which the respondents were asked to respond using a seven-point Likert scale, ranging from 1 (“strongly disagree”) to 7 (“strongly agree”).

The measures of *effectiveness of bidding agent* and “WTI” were based on the study of Pavlou and Gefen (2004). The researchers measured perceived effectiveness of the feedback mechanism by investigating its accuracy, availability, effectiveness, and reliability. They also measured the perceived effectiveness of escrow services through the guarantee it provides in terms of its functions. Based on the characteristics of bidding agents and “WTI”, the present study uses effectiveness, reliability and service quality, and function guarantees as the measurement items of the two variables.

The measure of *network effect* is based on the properties of network effect—a growing network can lend more “utility,” “benefit,” and “value” to its next participant (Chakravarty et al. 2006; Katz & Shapiro 1985; Zhu et al. 2006). Therefore, network effect in this study is measured by these three items, together with “convenience” added according to the realities of online auction websites.

The measure of *product diversity* was developed purposefully for this study. It was based on statements asserting that the products being auctioned off are of large quantity and variety, sound choices, and better inventory compared with those in other auction sites.

The measures of *utilitarian perception* and *hedonic perception* were adapted from the items in Na et al.’s study (2007). The items measuring the perception on product brands can be applied in this study by changing the word “product brand” into “website”. Hedonic perception was measured using indicators of good feelings, pleasant memories, social recognition, and sensory pleasure, whereas utilitarian perception was measured using performance, quality, usefulness (added), helpfulness, and credible image of the website.

The measures for *e-loyalty* to the website were adapted from (Cyr et al. 2007; Lam et al. 2004). In Cyr et al.’s study, perceived loyalty is measured by the reuse behavior of websites. We extend their measure by the description from two aspects: the frequent and regular bidding in the website in the future. In addition, Lam et al. (2004) recommended that loyalty is not only the patronage of an online vendor, but also the confidence in recommending the vendor. Therefore, a statement about recommendation to others is added in this measure.

### 4.2 Measurement Validation

Measurement validation is ensured by a scientific and rigorous procedure in the survey research. First, all measures were based on previously validated instruments that adhere to guidelines for online instrument construction (Boudreau et al. 2001; Fox et al. 1988; Straub 1989). Second, the questionnaire was initially developed in English and subsequently translated into the Chinese language by a doctoral student. A second doctoral student was invited to translate the Chinese version back into English. The original English and the translated versions were then compared by a professor to examine translation accuracy. Thus, the early version of the questionnaire was refined multiple times to ensure content validity.

Third, the questionnaire was pre-tested by four business professors experienced in IS survey research as well as 20 experienced online bidders. Based on their feedback and comments, changes were applied to the wording, grammar, and structure of the questionnaire to reduce ambiguity and improve
readability. Moreover, the sequence of the questions was rearranged to ensure questionnaire validity and reliability.

Finally, a pilot study was administered to 25 online bidders randomly chosen from the biggest online auction website in China, taobao.com. Cronbach’s alphas for all the items in this pilot test were above or near 0.80, suggesting adequate reliability of the questionnaire (Nunnally & Bernstein 1994). The pilot test also resulted in a few changes in wording and sentence structure, which improved the survey’s content validity.

4.3 Data Collection

The data were collected from the biggest online auction website in China, taobao.com. 1,299 bidders were randomly chosen from the auction websites. Only validated bidders, whose identities were verified by taobao.com, were selected to avoid contaminating the information with fake IDs. They were contacted through the online instant messenger WangWang with a brief introduction, including the research objective and requirements, as well as an invitation to participate in the study. They were informed of a RMB¥10 reward following the successful completion of an online survey to ensure sincerity to the research.

The bidders who responded positively were then requested to accomplish an online questionnaire hosted in the website of a professional online survey firm (www.surveymonkey.com). The use of this service guarantees access control, authentication and avoids multiple responses (Stanton & Rogelberg 2001). After two rounds of reminders, 449 bidders completed the questionnaire and responses were automatically collected by the online survey.

4.4 Data Analysis Method

Various statistical techniques were employed to confirm the reliability and validity of the instrument. Cronbach’s alpha of each measure was validated by the SPSS 15.0. Subsequently, confirmatory factor analysis (CFA) and structural equation modeling (SEM) was performed to check the good-fit-index of the measurement and structure models with Lisrel 8.54.

5 RESULTS AND ANALYSES

5.1 Respondents profile

Among the 449 respondents, 130 are male and 319 are female. The percentage of each sex is 29% and 71%. Most of them (44.4%) are between 25 to 30, then followed the age between 19 to 24 (28.3%) and age between 31 to 38 (21.4%). The percentages of other age periods are all below 10%. University education level has the highest percentage, 78.4%. Then high school education level 11.6%. The others are all under 10%. There are 27.7% respondents make money below 1500RMB/m. 39.7% of the respondents earn 1500-3000RMB/m and there are 20.9% earn money 3000-5000RMB/m. Only 11.6% has the monthly income above 5000RMB/m. Students and government or public employees are the most two parts among the respondents, then followed by IT workers and teachers, sales and the market workers.

5.2 Measurement model analysis

Cronbach’s alpha was calculated to test the reliability of the measurement. Most Cronbach’s alpha values are above or close to 0.9 except that the one of bidding experience (0.82) and the one of e-loyalty (0.7, still above the threshold). A confirmatory factor analysis (CFA) was then conducted to test the good-fit of the measurement model. The Chi-Square = 986.12 (df=329), RMSEA = 0.071 (≤0.08), NNFI = 0.97 (≥ 0.95), CFI = 0.97 (≥ 0.95), standardized RMR = 0.044 (≤ 0.06). The indices meet the requirement of measurement model, indicating that the measurement is quite good in this study.
The construct validity was then investigated. The convergent validity was established by the good-fit indices of the measurement model and the item loadings (all higher than 0.5). To further assess the discriminant validity, a series of constrained CFA models were developed to compare with the original unconstrained CFA model. In each constrained model, the correlation between one pair of constructs was constrained to 0.7. The Chi-Square change caused by the constraining works as the statistic to test discriminant validity. Significant change means the correlation of the two constructs is significantly far from 0.7. Our data analysis shows that all the correlations between each two constructs are significantly different from 0.7, thus confirming the discriminant validity.

5.3 Structural equation model

To test the research model, Structure Equation Modeling (SEM) is applied in this study. Using Lisrel 8.54, we ran a SEM model and got the results shown in Figure 2. The model fit indices are: Chi-Square = 1030.41 (df=335), RMSEA = 0.072 (≤0.08), NNFI = 0.97 (≥ 0.95), CFI = 0.97 (≥ 0.95) and standardized RMR = 0.052 (≤0.06). These indices show a good fit of the model and allow us to further analyze the model.

![SEM results of the research model](image_url)

From the results, we can see the explanatory power of this research model is high, with the R-square of the three exogenous variables, utilitarian perception, hedonic perception and e-loyalty, 55%, 54%, 47%, respectively. The hypotheses are all supported at p=0.05 or p=0.01 level.

H1 are all supported. The effects of utilitarian and hedonic perception on e-loyalty are proved. The relationship between the utilitarian and the hedonic perception is also verified -- utilitarian perception has not only directly effect on e-loyalty, but also indirectly effect through hedonic perception.

The two hypotheses of technological stimuli on utilitarian perception (H2) are also supported. The effectiveness of online auction technological services can significantly enhance the consumers’ utilitarian perception on the website.
Network effect influences both utilitarian and hedonic perception significantly, as indicated by the supported H3a and H3b. In terms of the influence of product diversity, although the standardized coefficients to utilitarian and hedonic perceptions are not big (0.09 and 0.10), the relationships are still statistically significant at p=0.05. Both H4a and H4b are supported. The more diversified the products are, the more utility and enjoyment customers perceive in the website.

6 IMPlications

The research findings in this study can bring much insight to both practitioners and researchers in this area. For example, utilitarian perception on online auction websites is quite important to increase the amount of the visit on online auction websites. It does not only directly affect customers’ e-loyalty, but also highly affect their hedonic perception which also positively influences their e-loyalty. Therefore, online auction website owners need to increase their utilitarian image by adjusting the stimuli, such as increasing the usefulness of technological services, increasing the network effect and providing more diversified products.

Among them, network effect which has biggest effect on utilitarian perception shows an important role in the e-loyalty to online auction websites. Therefore, website owners need to pay much attention to it which they may not be aware of before. Critical mass is quite important to online auction websites. Measures should be taken to enhance the network effect and increase the customers’ e-loyalty. For example, more sellers can be attracted to their auction websites and encouraged to provide more auction items. The online auction websites can also provide platforms for bidders to discuss their bidding experience to attract more bidders through word-of-mouth marketing.

In addition to the implications to practitioners, this research also contributes to the research in this line. First, it addresses the importance of e-loyalty to online auction websites, which hopefully attracts more studies on this topic. There are many studies on the e-loyalty to websites, such as online shops (Anderson & Srinivasan 2003; Semeijn et al. 2005; Srinivasan et al. 2002), portal site (van Riel et al. 2001), hotel-owne website (Miller 2005), and internet banking (Salmen & Muir 2003), etc. However, literature lacks of studies on e-loyalty to auction websites. In addition, we also found some specific influential factors to auction website, like network effect and effectiveness of bidding-related technologies. Secondly, a valid S-O-R paradigm was applied to construct the research model, providing a successful application of psychology theory in e-business area. Researchers are encouraged to apply valid paradigms from other disciplines in their studies. However, variation may be necessary during the application to different topics. This study also examines the antecedents of e-loyalty from a broader perspective. Brand perspective was introduced to this area and validated in this study, which may provide researchers more space to explore.

7 CONCLUSION AND FUTURE RESEARCH

This study investigates the e-loyalty to online auction websites by an S-O-R model. The research finding confirmed the relationship between stimuli, reaction, and response. Technology factors (the effectiveness of bidding agent and WTI and network effect) and brand factors (product diversity, utilitarian and hedonic perception) are all positively associated with the customers’ e-loyalty to the online auction websites.

However, limitations also exist in this study. First, for the technological stimuli, only two technologies/services are considered in this study. In addition to the effect of bidding agent and WTI that are specific to online auctions, the common technologies/services in online stores, such as feedback systems, escrow service, payment channel, etc., may be taken as control variables in the future. In addition, this study does not investigate the antecedents of network effect. Network effect plays an important role as shown in our model to predict the e-loyalty. Therefore, more research is needed to dig the underlying factors that may influence network effect in the future.
References


