Importance of Usability Considerations to Purchase Intention on E-Commerce Website with Different User Groups

Chen Ling
University of Oklahoma
Norman, Oklahoma

Gavriel Salvendy
Purdue University
West Lafayette, Indiana
Tsinghua University*
Beijing, China*

E-Commerce sales grow with unprecedented speed these years. The success of the E-Commerce website can be directly affected by its usability. A survey study was conducted to investigate the effect of 19 usability considerations on user's purchase intention with E-Commerce websites. Responses from 300 web users were obtained and analyzed. Factor analysis reveals that users' purchase intention on E-Commerce website is affected, in descending importance by the following five usability factors: trustworthiness, information access cost, shopping support, ease of comprehension, and hedonic quality. Some interesting differences among user groups of different gender, age, and ethnic background were also revealed, which can be used to guide design efforts for websites targeting special user groups.

INTRODUCTION

E-Commerce sales grow with unprecedented speed these years. The success of the E-Commerce website can be directly affected by its usability (Nielsen, 2001). The E-commerce website designers would benefit from knowing what usability considerations are more important to user's purchase intention, to prioritize their design efforts accordingly.

Some of the established models for information systems have been applied to E-Commerce websites. Research with Technology Acceptance Model (TAM) demonstrated that information systems perceived as easier to use and less complex are more likely to be adopted and used (Davis, 1989 ; Venkatesh & Davis, 2000). According to TAM, perceived ease of use (PEU) can influence information technology (IT) adoption (Tan & Teo, 2000). Henderson and Divett (2003) verified the applicability of TAM to E-Commerce site. The effect of perceived ease of use (PEU) and perceived usefulness (PU) on three behavior indicators of the usage of a grocery delivery website: log-ins, purchase value, and deliveries, were studied. PEU was measured with 3 items including easy to get what you want from system, easy to locate items, and easy to track items. Both of PEU and PU accounted for up to 10% in log-on behavior, 13% in the purchase value, and 15% of the variance in deliveries.

Results from Gefen and Straub (2000)'s study when applying TAM to E-Commerce websites were somewhat different. Analysis of survey data from 217 students showed that the PEU affected the IT adoption when the users used the website to inquire about the products, but did not affect IT adoption when the users used the website to purchase product. The PEU construct was described by five items including: website is easy-to-use; it is easy to become skillful at using the website; learning to operate the website is easy; the website is flexible to interact with; and interaction with the website is clear and understandable.

Kuan, Bock, and Vathanophas (2005) applied another model: Delone and McLean's model of information system success (2003) to E-Commerce websites. 21 usability attributes were classified into three quality dimensions: system quality, information quality, and service quality. Data from 102 students using two different service websites for providing traveling information demonstrated that all three quality dimensions are positively correlated with user's purchase intention.

Since the past studies on PEU were based on broadly defined items (Henderson & Divett, 2003; Gefen & Straub, 2000), which could not readily direct design practices, and the results were not consistent with each other, the relationship between specific usability considerations and user's purchasing intention was worth further exploring. In order to understand the importance of specific usability considerations in affecting user's purchase intention with E-Commerce websites, a survey study was conducted.

People from different gender, age, or ethnic groups may have different considerations and behaviors when purchasing from the E-Commerce websites. Data from several user groups: male and female, different age group, American and Chinese were separately studied and compared to detect any differences.

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METHOD

Subjects

In the survey study, data from 345 subjects were collected. 30 data was eliminated due to incomplete answers to survey questions and 15 were eliminated due to inconsistencies in the answers. The subjects were recruited from classrooms or through email invitations. Among the 300 subjects, 57% were male and 43% were female. 39% were American, 42% were Chinese, and 19% were from other ethnic groups. 66% of the subjects were students, 28% were professionals, and 10% belonged to other categories. 41% subjects were 18 to 25 years old, 42% were 26 to 35 years old, and 17% were above 35 years old. The online shopping experiences for subjects in five categories were as follows: never (4%), 1-5 times (19%), 6-10 times (16%), 11-20 times (19%), and over 20 times (43%).

Instrument

The E-Commerce Purchase Intention Survey was developed to investigate the relationship between the usability considerations and the user's purchase intention with E-Commerce websites. The survey items were selected on the basis of the usability heuristics (Nielsen, 1994), and existing E-Commerce website design rules (Nielsen, 2006). The usability attributes in Kuan et al. (2005)'study were classified into three dimensions: system quality, information quality, and service quality. Although information quality in terms how timely and how accurate the information presented can affect the purchase intention, it is not the focus of usability considerations in this study. Some of the item in the survey is selected in the system quality and service quality dimension in Kuan et al. (2005) study. The survey consisted of two parts. In the first part, information on subjects' demographics and general experience and attitude towards online shopping were collected. In the second part, questions asked about the perceived importance of 19 usability consideration to the subject's purchase intention. Seven-point Likert scales were used. The scale is anchored at two ends with 1 representing "extremely unimportant", 4 representing "neutral", and 7 representing "extremely important". All subjects were asked to mark the responses that best described their opinions about the importance of each usability considerations to their purchase intention on E-Commerce websites based on their own online shopping experiences.

RESULTS

Descriptive Statistic

The survey had an acceptable internal consistency (Cronbach alpha =0.74). On average, the subjects were interested in online shopping (mean=5.28, std. =1.563), and were satisfied with their online shopping experiences (mean =5.56, std. =1.026). The mean importance ratings for the survey items were between 4.06 and 6.66, and the standard deviations were between 0.71 and 1.51 (see Table 1).

The subjects' online experience was moderately correlated with online satisfaction ($r=0.4206$, $p<0.0001$) and interest in online shopping ($r=0.4135$, $p<0.0001$). People who had more online shopping experience tends to be those who are more interested in online shopping, and they also had higher level of satisfaction from the shopping experience. MANOVA did not reveal any significant difference of importance ratings among subjects with different levels of online shopping experiences.

Table 1. Importance Rating of Usability Considerations to Purchase Intention

Item Description	Mean	Std.
Security & privacy	6.66	0.798
Confirmation	6.26	1.009
Feedback	6.15	0.803
Easy-to-follow checkout	6.14	0.807
Content organization	6.03	0.886
Loading time	5.99	1.002
Constructive error message	5.85	1.021
Clear link description	5.85	0.968
Instruction and help	5.76	0.971
Robust search	5.70	1.223
Easy navigation	5.67	0.961
Clear layout	5.62	1.189
Not using jargon	5.46	1.278
Consistent term	5.44	1.182
Uncluttered page	5.28	1.172
Know current location	5.12	1.189
Interesting to explore	5.07	1.237
Visually attractive	5.04	1.242
Personalize	4.06	1.511

Exploratory Factor Analysis

A factor analysis on the survey responses were performed to derive the latent dimension of the E-Commerce website usability considerations that affect the subject's purchase intention. Five factors were revealed with eigenvalues of greater than 1. They together explained 57.12% of the variance in the responses. The factors with the corresponding loaded items were listed in Table 2. The item "navigation" was dropped from the factor analysis because it loaded on more than one scale. Based on the factor scores calculated by averaging out the importance ratings of the loaded items, the five factors were listed in descending order of the importance ratings (shown in parenthesis) as follows: trustworthiness (6.46), information access cost (5.85), shopping support (5.81), ease of comprehension (5.71), and hedonic quality (4.92). The factor "trustworthiness" included items of website's security and privacy terms, and confirmation for transaction actions. Both of these were related to user's feeling of trustworthiness towards the website. The factor "information access cost" included items

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of loading speed and search function, which deal with how fast and easy for users to get information from the website. Factor "shopping support" contained five items that were related to the support that the website provided to enhance user's shopping experience when checking products out. Factor "ease of comprehension" contained items that were related to user's experience of getting around in the website and understanding the information presented. Factor "hedonic quality" included items that were related to how appealing the website was designed, and how fun it was to use the website.

Table 2. Usability Factors Derived Based on Usability Considerations

Usability Factors	Loaded Usability Consideration Items	% Variance Explained
Ease of Comprehension	Uncluttered page; Consistent term; Clear link description; Not using jargons; Content organization	29.7
Shopping Support	Easy-to-follow checkout ; Know current location; Feedback; Instruction and help; Constructive error message	8.2
Information Access Cost	Robust search; Loading time	7.6
Hedonic Quality	Interesting to explore; Clear layout; Visually attractive; Personalize	6.6
Trustworthiness	Security & privacy; Confirmation	5.1

Comparison between Male and Female Subjects

Male and female shoppers demonstrated different shopping behaviors in the conventional shopping environments. Women usually view shopping as recreational and enjoy the conventional shopping more than men (Bellenger & Korgaonkar, 1980). With the advent of E-commerce websites, it is possible to shop from online without physically leaving home. Men were found to view this new form of shopping more positively and are more likely to make online purchases (Slyke, Comunale, & Belanger, 2002). It is interesting to know how men and women view the importance of the usability considerations for E-commerce website design differently in relation to their online purchase intention. The survey responses were separated into those of the male (N=171) and the female subjects (N=129). The Chi-square analysis on the shopping frequency data of the male and female subjects revealed significant relationship between gender and shopping frequency (chi-square=12.22, df =4, p=0.016). The male subjects had more online shopping experiences than the female subjects. There is no significant difference between the two genders' interests in online shopping (t_{298}=1.73, p=0.084) and satisfaction with online shopping (t_{298}=1.92, p=0.056).

Separate t-tests were performed on all survey item responses. Differences between genders for two items approached significance. The female subjects considered "loading time" (t_{298}=1.97, p=0.049), "not using jargon" (t_{298}=2.45, p=0.015), "visually attractive" (t_{298}=3.23, p=0.001), "easy-to-follow checkout", (t_{298}=2.38, p=0.017) as more important than the male subjects.

Comparison among Subjects from Different Age Groups

E-Commerce website users include people from different age groups. It would also be valuable to know how people in different age groups view the importance of the usability considerations for E-commerce website design differently. The survey responses had the highest concentrations in two age groups: 18-25 (N=124), 26-35 (N=126). So, responses from these two age groups were analyzed. The satisfaction and interest level in online shopping was not significantly different among the two age groups. The Chi-square analysis on the shopping frequency data of subjects of different age groups revealed that age and shopping frequency are related (chi-square=17.14, df =4, p=0.0018). People in the 26 to 35 group had more online shopping experience than the people in the 18 to 25 group. This made sense because the 26-35 group represented young professionals, who may have better social-economic status than the 18-25 group who were mostly students.

Separate t-tests were performed on all survey item responses. Compared to people from age group 26 to 35, people in age group of 18 to 25 considered items of "interesting to explore" (t_{248}=2.05, p=0.0413), "visually attractive" (t_{248}=2.47, p=0.014) and "confirmation" (t_{248}=2.91, p=0.004) as more important, but items of "constructive error message" (t_{248}=2.02, p=0.044) and "clear layout" (t_{248}=1.97, p=0.049) as less important

Comparison between American and Chinese Subjects

Globalization is the trend for E-Commerce websites development. Because China has the world's largest population, and fast growing internet user population, Chinese users constitute an important buying power for E-Commerce websites. It is of interest to study whether the Chinese users' perceptions are different from those of the American users when deciding to buy from E-Commerce websites or not. Responses from American subjects (N=118) and the Chinese subjects (N=126) were studied. A Chi-square analysis showed that the shopping frequency data are different between the two groups (chi-square=10.78, df =4, p=0.029). More Chinese subjects had shopping experience of over 20 times than the American subjects. But the American subjects had higher satisfaction from online shopping than the Chinese subjects (t_{242}=2.05, p=0.042).

T-tests were performed on responses to each individual usability considerations in the survey. The results

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revealed that American subjects consider items of "confirmation" (t_{242}=2.83, p=0.005), "feedback" (t_{242}=2.10, p=0.032), "content organization" (t_{242}=2.88, p=0.005), and "easy navigation" (t_{242}=2.74, p=0.007) as significantly more important to their purchase intention than the Chinese subjects. On the other hand, the Chinese subjects considered items of "clear layout" (t_{242}=2.06, p=0.040), "know current location" (t_{242}=2.65, p=0.008), and "personalization" (t_{242}=4.40, p=0.000) as significantly more important than the American subjects.

DISCUSSION

Among the five factors derived by factor analyses on the usability considerations, the factor "trustworthiness" had the highest factor score and was considered as the most important to user's purchase intention. People needed to trust the website to purchase from it (Pavlou, 2001). The factor "hedonic quality", on the other hand, was considered as the least important. The reason may be that people visiting the E-Commerce website were mostly task-oriented. The "fun" factors were not directly related to tasks, and therefore did not directly affect the subject's purchase intention. Overall, all the items received importance rating of above 4.0 (neutral). Therefore, although some items were rated as more important than others, all usability considerations should be kept in mind by the website designers.

Comparisons of gender, age, and ethnic groups revealed some interesting findings. When comparing the gender differences in online shopping, the male subjects demonstrated significantly higher online shopping frequency than the female subjects. This finding was in agreement with the previous research on gender difference with E-Commerce websites (Slyke, Comunale, & Belanger, 2002). Analysis on the responses of the two genders demonstrated slight differences in perceived importance for some usability considerations. The results might give some design direction for personalizing webpage for different users. The websites primarily targeting female users need to be designed with special considerations of short loading time, not using jargon, visually attractive, and easy-to-follow checkout process.

The difference revealed between the age groups of 18 to 25, and 26-35 can be used to direct design efforts for websites targeting these two user groups. For people aged 18 to 25, the websites should focus on making it visually attractive and interesting to explore. It should also give clear confirmation information on their transactions. For people aged 26-35, more attention should be on designing clear layout and constructive error messages.

The American subjects were found to be more satisfied with their online experience than the Chinese subjects. They considered items of "confirmation" "feedback", "content organization" and "easy navigation" significantly more important to their purchase intention than the Chinese subjects, and the Chinese subjects considered items including "clear layout", "know current location", and "personalization" significantly more important than the American subjects. When designing website for these two groups of users, or developing a global websites with localized versions, special attention should be paid to their different needs.

The survey method was used in this study to elicit relationship between different usability considerations and user's purchase intention with E-commerce websites. The respondents in the survey study gave their responses based on their past online shopping experience with E-commerce websites in general. Future studies may include empirical experiments with various websites to cross-validate the survey results.

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