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Pratyush Bharati
University of Massachusetts

Abhijit Chaudhury
Bryant College

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Influence of Choiceboards on E-Commerce Customers: An Empirical Study of Factors Impacting User Satisfaction

Pratyush Bharati  
University of Massachusetts  
Pratyush.Bharati@umb.edu

Abhijit Chaudhury  
Bryant College  
achaudhu@bryant.edu

ABSTRACT
Choiceboard technology is increasingly being offered in e-commerce environments. This technology allows customers to configure their products and services by choosing from a menu of attributes, components, delivery options, and prices. This paper examines, in the context of a choiceboard environment, the impact of system and information quality, and information presentation on information and decision satisfaction. Moreover, we examine the impact of latter two factors on overall user satisfaction and intention to use. The research reveals that increased system quality of choiceboard leads to higher information and decision satisfaction on the part of the users. This in turn leads to higher overall satisfaction and intention to use. The research uses an experiment for data collection and examines these relationships using the Structural Equation Modeling (SEM) approach.

Keywords  
e-Commerce, User Satisfaction, Systems Quality, Customer Relationship Management (CRM), Strategic Information Systems.

INTRODUCTION
The volume of direct business to consumer e-commerce continues to grow regardless of recession and reduced spending on information technology. E-Commerce retailers are using technologies such as email, FAQ, online customer support, bulletin boards and search engines to assist customers in the buying decision process. Choiceboard is a recent addition to this repertoire of technologies aiding consumers in their decision-making process (Andal-Ancion, Cartwright, and Yip, 2003; Collins and Butler, 2003; Liechty, Ramaswamy and Cohen, 2001; Slywotzky, 2000). These systems allow customers to design their own products by choosing from a menu of attributes, components, prices, and delivery options (Slywotzky, 2000). For example, in the apparel industry (www.landsend.com), users can develop a virtual model of oneself to try out different dress alternatives before ordering; in the finance industry (www.calvertgroup.com), users can design various retirement saving alternatives; in the toys industry (www.vermontteddybear.com), teddy bears can be custom designed and ordered with respect to color, size, and coat-type; finally, on web-sites of most desktop computer makers (www.dell.com), individuals can start with a basic configuration defined by a processor and then go on to specify the full configuration consisting of hard-drive size, memory, and add-ons such as CD-ROMs, monitors, and printers.

Although choiceboard technology is widely being used to enhance customer experience, very little is known about the actual impact of this technology on overall user satisfaction and the intention to use the system. In particular, it remains unclear how the provision of more information, facilitation for decision-making through what-if analysis, and choice comparisons through the use of choiceboard technology affects user satisfaction and the intention to use. In this research, we develop and operationlize the relationships between system level factors such as quality of the system and information in choiceboards, and presentation of information on user’s decision and information satisfaction. Furthermore, we investigate the relationship between information and decision satisfaction and overall satisfaction and intention to use. The statistical analysis consists of path analysis, which assesses a pattern of predictive relationships among the measured variables. This research employs the Structural Equation Modeling (SEM) technique to analyze the data and then assesses the pattern of predictive relationships among the measured variables.
**RESEARCH OBJECTIVES**

The primary objectives of this research are: (1) to validate the theory of information systems success in the new domain of e-commerce and, in particular, in the context of choiceboard systems; (2) to understand how choiceboard facilitates the process of user decision-making in the web-based environment; (3) to develop a conceptual model that relates system level factors, user satisfaction factors, and use factors; (4) specifically, to investigate inter-relationships between the components of user satisfaction such as information satisfaction, decision satisfaction, and overall satisfaction, and their joint impact on intention to use.

**RESEARCH MODEL AND THEORETICAL BACKGROUND**

The research is related to multiple theories such as the well-known consumer decision-making model (Mowen 1995), consumer information processing model (Bettman 1979), cognitive decision-making model (Simon 1955), and information systems (IS) success model (Delone and McLean 1992), which is based on Shannon and Weaver’s (1949) communications theory. According to Mowen (1995), a consumer transits through several phases (Figure 1) such as problem recognition, search of alternatives, and evaluation of alternatives before making the final choice. That is, there is an information processing phase and a decision-making phase. In this processes, according to Bettman (1979), a consumer tries (1) to minimize cognitive effort required to make a decision and (2) to maximize the quality of the decision. Furthermore, Bettman (1990) suggests that due to bounded rationality constraint (Simon 1955), consumers trade-off decision quality for a reduction in information processing effort.

![Figure 1: Customer Decision Process Model (Mowen, 1995)](image)

Consumers use decision-aids such as calculators, spreadsheets, consumer guides, and web-based comparison pricing in order to lessen the impact of bounded rationality constraint on decision quality. E-commerce retailers are incorporating choiceboards on their web-sites to assist customers in several phases of the consumer decision-making process. For example the information search phase is facilitated through easy creation of product alternatives, and the decision-making phase of alternatives evaluation is made easy through price and feature comparison. The IS success model (Delone and McLean 1992) with its focus on issues relating to information processing and decision-making is used to investigate the role of choiceboards in assisting users.

The IS success model is based on Shannon and Weaver’s communication theory (1949) and Mason’s theory (1978). Delone and McLean (1992) developed an IS success model where the concept of levels of output from communication theory demonstrates the serial nature of information production and use. IS creates information which is communicated to the recipient, who in turn is or is not influenced by the information. The information flows through a series of stages, from its production through its use to its influence on the individual and/or organizational performance.

The IS success model suggests systems quality and information quality singularly and jointly affect both use and user satisfaction. This research model is partially based on the IS success model since it employs the constructs at the technical level, viz., systems quality and information quality, in the context of choiceboards, and finally its impact on different components of user satisfaction such as interface satisfaction, decision-making satisfaction and resultant overall satisfaction (Figure 2).

**Conceptual Model**

The research model (Figure 2), which is based on the IS Success Model (DeLone and McLean, 1992), shows that system and information quality, and information presentation impact the different components of user satisfaction and, therefore, intention to use. The various constructs in the model and the hypotheses are explained in this section.
System Quality
Individual perception of system’s overall performance that is a manifestation of system hardware and software is termed as system quality. System quality has been measured using ease of use (Belardo, Karwan, and Wallace, 1982), convenience of access (Bailey and Pearson, 1983), and system reliability and flexibility (Srinivasan, 1985).

Information Quality
The user estimates the value of an information system after evaluating the quality of information (Gallagher, 1974). The five measures that have been used for the information quality construct are information accuracy (Bailey and Pearson, 1983; Mahmood, 1987; Miller and Doyle, 1987; Srinivasan, 1985), information completeness (Bailey and Pearson, 1983; Miller and Doyle, 1987), information relevance (Bailey and Pearson, 1983; King and Epstein, 1983; Miller and Doyle, 1987; Srinivasan, 1985), information content needs (Doll and Torkzadeh, 1988), and information timeliness (Bailey and Pearson, 1983; King and Epstein, 1983; Mahmood, 1987; Miller and Doyle, 1987; Srinivasan, 1985).

Information Presentation
Information presentation examines how information is displayed based on display formats, colors, and graphs versus tables (Vessey, 1994). The measures of information presentation are graphics, color, presentation style, and navigational efficiency because the evaluation of the interface should include characteristics of the interface in terms of presentation, format, and processing efficiency (Swanson, 1985-86).

Interface Satisfaction
The quality of the information system interface is measured in interface satisfaction. The indicators used to measure interface satisfaction are ‘easy to work’ (Doll and Torkzadeh, 1988; Goodhue, 1990), ‘useful format’ (Doll and Torkzadeh, 1988; Goodhue, 1990), ‘user friendly’ (Doll and Torkzadeh, 1988; Goodhue, 1990), ‘does what I want it to do’ (Davis, 1989; Goodhue, 1990) and ‘clear and understandable’ (Davis, 1989; Goodhue, 1990).

Hypothesis 1: System quality will positively contribute to interface satisfaction.
Hypothesis 3: Information quality will positively contribute to interface satisfaction.
Hypothesis 5: Information presentation will positively contribute to interface satisfaction.

Decision-Making Satisfaction
The ability of a system to support a user’s decision-making and problem-solving activities results in decision-making satisfaction. The construct has been operationalized to assess if the system supports the individual in recognizing problems, structuring problems, and making decisions related to the goal of controlling a business process (Garrity and Sanders, 1998). The construct measures the decision-making satisfaction using decision effectiveness (Chervany, Dickson, and Kozar, 1972) and decision confidence (Goslar, Green, and Hughes, 1986; Guental, Surprenant, and Bubeck, 1984; Zmud, Blocher, and Moffie, 1983).

Hypothesis 2: System quality will positively contribute to decision-making satisfaction.
Hypothesis 4: Information quality will positively contribute to decision-making satisfaction.
Hypothesis 6: Information presentation will positively contribute to decision-making satisfaction.

Overall Satisfaction
Satisfaction is a very important and thus a very widely used construct in the IS literature. Bailey and Pearson (1983) developed a user satisfaction instrument that has been modified by numerous researchers. Overall satisfaction is a result of interface and decision-making satisfaction. It has been measured using ‘if the system was extremely useful’ (Sanders, 1984) and ‘if it had been satisfactory in meeting user needs’ (Alavi and Henderson, 1981; Sanders and Courtney, 1985).
Hypothesis 7: Interface satisfaction will positively contribute to overall satisfaction.

Hypothesis 8: Decision-making satisfaction will positively contribute to overall satisfaction.

**Intention to Use**

Intention to use a system has often been employed as an important measure of IS success (DeLone and McLean, 1992). Actual use as a measure only makes sense with voluntary or discretionary users and might not be as useful a measure in experimental situations (Lucas, 1978; Welke and Konsynski, 1980). Therefore, it would be better to ascertain the intention of the user in using the system. ‘Possible to use’ and ‘intend to use’ (DeSanctis, 1982) have been used to measure this construct.

Hypothesis 9: Overall satisfaction will positively contribute to intention to use.

**Figure 2: Conceptual Model**

**RESEARCH METHODOLOGY**

The constructs were developed based on prior research and scale items were adapted or borrowed from validated instruments (Table 1). The survey was administered in a laboratory setting with PCs running on the wintel platform. The subjects were undergraduate and graduate MBA students at two different Universities. The researchers, in conducting the experiment, adopted the following procedure. First, the experimental procedure was explained to the subjects. Then, each subject was randomly assigned a website that employed a choiceboard in order to configure a product. The choiceboard sites were of a very similar nature, despite being owned by different firms. After configuring a product on the website, each subject completed a survey questionnaire. The total sample for the experiment was 192 subjects.
Table 1: Constructs, Measures and Relevant Instruments

<table>
<thead>
<tr>
<th>Construct Name</th>
<th>Item No.</th>
<th>Item Measured</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Quality</td>
<td>V 1</td>
<td>System reliability</td>
<td>Srinivasan, 1985</td>
</tr>
<tr>
<td></td>
<td>V 2</td>
<td>Convenient to access</td>
<td>Bailey and Pearson, 1983</td>
</tr>
<tr>
<td></td>
<td>V 3</td>
<td>System ease of use</td>
<td>Belardo, Karwan, and Wallace, 1982</td>
</tr>
<tr>
<td></td>
<td>V 4</td>
<td>System flexibility</td>
<td>Srinivasan, 1985</td>
</tr>
<tr>
<td>Information Quality</td>
<td>V 5</td>
<td>Information accuracy</td>
<td>Bailey and Pearson, 1983; Mahmood, 1987; Miller and Doyle, 1987; Srinivasan, 1985</td>
</tr>
<tr>
<td></td>
<td>V 6</td>
<td>Information completeness</td>
<td>Bailey and Pearson, 1983; Miller and Doyle, 1987</td>
</tr>
<tr>
<td></td>
<td>V 7</td>
<td>Information relevance</td>
<td>Bailey and Pearson, 1983; King and Epstein, 1983; Miller and Doyle, 1987; Srinivasan, 1985</td>
</tr>
<tr>
<td></td>
<td>V 8</td>
<td>Information content needs</td>
<td>Doll and Torkzadeh, 1988</td>
</tr>
<tr>
<td>Information Presentation</td>
<td>V 10</td>
<td>Presentation graphics</td>
<td>Swanson, 1985-86; Vessey, 1994</td>
</tr>
<tr>
<td></td>
<td>V 11</td>
<td>Presentation color</td>
<td>Swanson, 1985-86; Vessey, 1994</td>
</tr>
<tr>
<td></td>
<td>V 12</td>
<td>Presentation style</td>
<td>Swanson, 1985-86; Vessey, 1994</td>
</tr>
<tr>
<td></td>
<td>V 13</td>
<td>Navigationally efficient</td>
<td>Swanson, 1985-86; Vessey, 1994</td>
</tr>
<tr>
<td>Decision-making Satisfaction</td>
<td>V 14</td>
<td>Decision confidence</td>
<td>Goslar, Green, and Hughes, 1986; Guental, Surprenant, and Bubeck, 1984; Zmud, Blocher, and Moffie, 1983</td>
</tr>
<tr>
<td>Interface Satisfaction</td>
<td>V 15</td>
<td>Decision effectiveness</td>
<td>Chervany, Dickson, and Kozar, 1972</td>
</tr>
<tr>
<td></td>
<td>V 16</td>
<td>Easy to Work</td>
<td>Doll and Torkzadeh, 1988; Goodhue, 1990</td>
</tr>
<tr>
<td></td>
<td>V 17</td>
<td>Useful Format</td>
<td>Doll and Torkzadeh, 1988; Goodhue, 1990</td>
</tr>
<tr>
<td></td>
<td>V 18</td>
<td>User Friendly</td>
<td>Doll and Torkzadeh, 1988; Goodhue, 1990</td>
</tr>
<tr>
<td></td>
<td>V 19</td>
<td>Does What I want it to do</td>
<td>Davis, 1989; Goodhue, 1990</td>
</tr>
<tr>
<td></td>
<td>V 20</td>
<td>Clear and Understandable</td>
<td>Davis, 1989; Goodhue, 1990</td>
</tr>
<tr>
<td>Overall Satisfaction</td>
<td>V 21</td>
<td>Satisfactory in Meeting Needs</td>
<td>Alavi and Henderson, 1981; Sanders and Courtney, 1985</td>
</tr>
<tr>
<td></td>
<td>V 22</td>
<td>Extremely Useful</td>
<td>Sanders, 1984</td>
</tr>
<tr>
<td>Intention to Use</td>
<td>V 23</td>
<td>Intend to Use</td>
<td>DeSanctis, 1982</td>
</tr>
<tr>
<td></td>
<td>V 24</td>
<td>Possible to Use</td>
<td>DeSanctis, 1982</td>
</tr>
</tbody>
</table>
The data was analyzed using the structural equation modeling (SEM) approach. Structural equation modeling allows the specification of measurement errors within a broader context of assessing measurement properties and subscribes to a causal indicator model, where the operational indicators are reflective of the unobserved theoretical construct. The construct will be validated by conducting various tests such as confirmatory factor analysis, content validity, unidimensionality analysis, reliability analysis, convergent validity, discriminant validity, and criterion-related validity.

PRELIMINARY RESULTS AND FUTURE WORK
The data was analyzed using AMOS, a SEM package from SPSS. Preliminary results indicate that the model is supported by the data. The results of the SEM analysis and major findings will be presented at the conference.
References


