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User satisfaction with Web-based DSS: The role of cognitive antecedents

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ABSTRACT

Websites play a critical role in attracting customers and providing information to assist Web customers in decision making. Despite the importance of such systems providing a satisfactory experience, as per our knowledge no effort has been made to systematically examine the underlying causal structure among important decision related variables such as perceived effort, perceived information accuracy, perceived effectiveness, and satisfaction using Web-based decision support systems (Web-based DSS) that provide information to potential customers. In this study, we develop a conceptual model for investigating cognitive antecedents to Web users' satisfaction in the context of Web-based DSS. The empirical examination of the research model using structural equations modeling indicates that perceived effectiveness is influenced by perceived information accuracy and effort, and in turn, has positive impact on satisfaction in using Web-based DSS. The implications of this study suggest to information managers that providing customers with highly accurate information from web sites requiring lower effort is perceived as an effective system and such perception leads to increased satisfaction.

1. Introduction

The Internet has enabled retailers to exploit opportunities provided by the World Wide Web, such as rapid dissemination of up-to-date information to customers, and it has given retailers control over the formatting and aggregation of information the customers receive (Shim et al., 2002). In the rush to establish an online presence, however, many e-commerce Web sites were developed with little attention to the features that would enhance consumers' satisfaction with their Web-informed decision making process. Over 80% of Web shoppers have left electronic markets without knowing what they want, and 23% of attempted transactions ended up in failure, and, furthermore, only about 2% of the users who visit a Web site end up making a purchase (Silverman, Bachann, & Al-Akharas, 2001). Nonetheless, the growth of Web retailing is compelling the Web retailers to be competitive in the way they provide product information to consumers. Therefore, designing Web sites that facilitate consumers' decision making processes so that they are effective and satisfying is becoming an important concern for Web retailers.

Most prior studies of decision support systems (DSS) examined the role of DSS as a contributor to decision performance (Silver, 1991; Todd & Benbasat, 1992). More precisely, some studies investigated decision strategies for processing information and found the trade-off relationship between accuracy and effort (Chenoweth, Dowling, & Robert, 2004; Johnson & Payne, 1985). Sharda, Steve, & McDonnel (1988) and Lilien, Ragaswamy, Van Bruggen, & Starke (2004) studied DSS effectiveness. Vessey and Galletta (1991) proposed the cognitive fit perspective for understanding the use of information displays in decision making. Parikh, Fazlollahi, & Verma (2001) and Silver (1991) examined how DSS functionalities enlighten users' decision-making processes. Todd and Benbasat (1991) used cognitive fit model of decision making to show that decision makers' goal to maximize decision performance depends on the effort required to implement various decision strategies. Such studies that emphasized decision performance typically downplayed or ignored the level satisfaction of the DSS users.

With the growth of competitive Web retailing, however, understanding how to satisfy customers who obtain their information from web sites will be critical for establishing long-term client relationships, which consequently increases profitability (McKinney, Yoon, & Zahedi, 2002). Therefore, understanding how Web users formulate satisfaction when obtaining information is of great importance to Internet business. However, based on our knowledge, there are very few studies that systematically examined cognitive antecedents to satisfaction of users obtaining their information from Web-based DSS.

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In this study, we advance a model of the decision making process while obtaining information using DSS in the Internet environment to address the following research question: What are the antecedents of Web-based DSS users' satisfaction? To answer this question, we propose and test a research model which hypothesizes that perceived information accuracy and effort influence Web users' perceived effectiveness, which in turn affects Web users' overall satisfaction. This study was conducted in three phases to test our research model. In the first phase, from representative decision makers we identified important decision variables in our decision context (apartment selection) and obtained actual data to create realistic decision tasks. In the second phase, we developed three different Web sites, which varied in their effort demands and potential for perceived information accuracy vis-à-vis their user's preferences. In the third phase, we developed an instrument based on prior literature to measure important constructs, such as Web users' satisfaction with Web-based DSS and its antecedents. The model was tested in a controlled laboratory experiment. Structural equation modeling was used for data analyses. In what follows, the next two sections provide background and propose the research model and hypotheses for the study. The subsequent two sections report research design and data analyses. In the final section, we provide the conclusion of this study.

2. Background

In the following section, we present background literature concerning the types of Web DSS including a discussion on decision strategies, the relevance of Web-based DSS in supporting consumer decisions, and satisfaction with Web-based DSS.

2.1. Types of Web DSS

Consumers when searching for products in online environments face almost an infinite amount of information. A review of pricegrabber.com, an online price comparison website shows that there are 6246 laptop computers, 2817 vacuum cleaners, and 23,631 women's perfumes available for consumers to make a choice. In the absence of some assistance from a decision-support tool, evaluating a large number of products and making a final choice is cognitively demanding for consumers. A decision support system (DSS) is "as an interactive information system that provides information, models and data manipulation tools to help make decisions in semi-structured and unstructured situations where no one knows exactly how the decisions should be made" (Silverman et al., 2001, p. 818). On the other hand, Web DSS, also known as recommendation agents (RAs), assist consumers with the online decision-making process by incorporating the consumer preferences either explicitly or implicitly and provide recommendations based on such preferences (Xiao & Benbasat, 2007). Some of the common implementations of Web DSS include decision-support tools such as content-filtering, collaborative filtering, feature-based, need-based, etc. (please refer to Xiao & Benbasat, 2007 for an in-depth discussion).

However, Web DSS can also implement decision strategies, which are the rules used by decision makers to arrive at decisions (Hogarth, 1987). Research investigating decision strategies used by individual decision makers has a long history, and the traditional DSS literature relied on this literature to make important contributions. The Web DSS literature attempts to continue the research tradition by addressing the problem of human decision-making in online environments. Compensatory and non-compensatory strategies are examples of decision strategies employed by decision makers. A compensatory Web DSS employs a compensatory strategy; where as a non-compensatory Web DSS incorporates one of the many non-compensatory strategies. The following discussion provides an introduction to compensatory and non-compensatory strategies by using an example.

Table 1
Example of a preferential choice problem.

Alternatives	Attributes		
	Price	Reliability	Safety
Car A	$ 25,000 (8)	Excellent (10)	Excellent (10)
Car B	$ 22,000 (10)	Very Good (10)	Excellent (10)

The following example illustrates a fictitious choice problem in the context of buying a car. Please refer to Table 1.

In this problem, the decision-maker encounters a conflict in the choice problem. Car A has excellent reliability and safety but has higher price. Car B has lower price but its reliability is marginally lower than that of Car A. This situation represents a typical multi-attribute choice problem with conflicts in the choice situation. A decision-maker employing a non-compensatory choice avoids confronting the conflicts inherent in the choice situation and does not trade-off a low value on one attribute against a higher value on another attribute (Hogarth, 1987). For instance, if the decision-maker just considers the attribute 'price' and sets a cut-off limit of $24,500 for her budget, then no matter how good Car A is on the remaining attributes, it will lose out to Car B. One example of a non-compensatory strategy is a conjunctive rule. According to this rule, the decision-maker sets certain cut-off values on the attributes that a chosen alternative must equal or exceed. If an alternative does not meet cut-off value on at least one of the attributes, it will be eliminated (Svenson, 1979). In the example, if the decision-maker sets the cut-off values of reliability and safety to "10" and "10" respectively, car B is eliminated irrespective of the fact that it is cheaper compared to car A.

A decision-maker using a compensatory strategy confronts the choice conflict and can trade off lower value of one attribute against a higher value on another attribute (Hogarth 1987). For instance, the decision-maker in the example might say, "even though car A is higher on the price, I will take it because it is more reliable than car B." The willingness to confront the conflict in choice situation and to balance the alternatives by incorporating individual preferences is the hallmark of a compensatory strategy. The weighted-additive strategy (WAD) represents one example of a compensatory strategy. The decision-maker implementing the WAD must first provide weights to each attribute that reflect the relative importance, rate each alternative on each attribute, and add the product of the weights and ratings for all attributes for a given alternative. The alternative with the highest weighted average is the option that is most consistent with the specific decision-maker's preferences (Hogarth 1987). For instance, assume that the decision-maker in example provides weights of 30, 30, and 40, respectively to Price, Reliability, and Safety. The ratings for each attribute for each alternative are provided in Table 1 under each attribute value. When the decision-maker multiplies the weights with the ratings for each attribute and adds it for all attributes, a weighted additive score is computed. The weighted additive score for car A is 940 and car B is 970. Car B has a better score than car A for the decision-maker because it meets the decision-maker's preferences better than car A. The WAD method is considered rational and normative (prescribed) method for two reasons. First, it incorporates the decision-maker's preferences and second, it utilizes all the information in a decision-making situation to computer the weighted additive scores.

A non-compensatory Web DSS allows the decision-maker to execute non-compensatory strategies in a number of ways. First,