December 2003

A Discussion of Web-Based Consumer Decision Support Systems (WCDSS) and Their Effectiveness

Qingxiong Ma
Southern Illinois University, Carbondale

Souren Paul
Southern Illinois University, Carbondale

A DISCUSSION OF WEB-BASED CONSUMER DECISION SUPPORT SYSTEMS (WCDSS) AND THEIR EFFECTIVENESS

Qingxiong Ma
Southern Illinois University, Carbondale
cgqm@siu.edu

Souren Paul
Southern Illinois University, Carbondale
paul@cba.siu.edu

Abstract

In this study, web-based consumer decision support system (WCDSS) is conceptualized, and its functionalities are examined against the stages of the online purchasing process. We propose that the WCDSS positively moderates the relationship between online transaction system and consumers purchasing decisions in terms of perceived information quality, decision time, consumer satisfaction, and intention to use.

Keyword: Web-based consumer decision support systems, system effectiveness

Introduction

"MyGeek.com Enhances Website With Buying Decision Software." (Internet Wire, Oct 12, 2000)

"Sixty Percent of Top Internet Sites Rely On Active Decisions' Guided Selling Applications." (Business Wire, July 30, 2001)

"Decision support simplified for online Insurance service."(M2 Presswire, Aug 28, 2001)

These statements indicate an increasing trend of using software applications to facilitate consumer-purchasing decisions in e-commerce. Businesses realized that just providing a virtual catalog alone on a Web site is not enough for consumers since they may need additional support during their purchasing process. M2 Presswire (June 13, 2002, p.1) reported that around "65% of transactions online are never completed, most commonly, because the buying process is too slow, complicated, impersonal or because the user could not specify what they wanted." With overloaded yet incomplete information on products being searched, and with many purchasing criteria in mind, it is quite hard for a consumer to make a purchasing decision. In order to offer superior Web purchasing experience and differentiate themselves from others with better services, and in turn, increase their revenues, companies began to integrate Web-based consumer decision-support systems (WCDSS) into their web sites. For instance, Active Buyer's Guide[SM] is a Web-based product recommendation engine for consumers who need help to decide what to buy. It has the intelligence to find out consumer preferences and identify the right products for each individual. As consumers, many of us have benefited from such decision support systems without being aware of them. Usually, these systems are seamlessly integrated into the shopping system.

In the e-commerce market w here the competition is only a click away, it is very difficult to build customer loyalty and confidence. Although many businesses have tried hard to attract and keep customers using promotion strategies, these promotional activities (such as free shipping, gifts, and discounts) tend to continue on a regular basis, and drain out the company in the long run (Windham & Orton, 2000). Therefore, when companies initiate another strategy to retain customers such as implementing a consumer decision-support system, it becomes crucial to consider the effectiveness of the system because any futile expense might jeopardize business survival especially under the vulnerable condition of the economy. To some extent, how well the projected benefits can be gained from the WCDSS initiative depends on how effectively the WCDSS can help consumers in the purchasing process. Naturally, it is reasonable to ask how WCDSS will effectively impact consumers. To answer this question, the following fundamental issues are required to be addressed:

- What s WCDSS? What characteristics does it have?
- What kind of functions does a WCDSS provide? How does it help consumers in the purchasing process?
- How to evaluate the effects of WCDSS, (especially when it is embedded into the shopping system)?

Although some studies have been done to assess the potential importance and effectiveness of decision support systems (DSS) in customer relationship management, sales analysis, and customer information gathering, the research on WCDSS is very limited (O'Keefe & McEachern 1998; Berndt 2001). The purpose of this study is to conceptualize WCDSS and discuss its effectiveness in terms of information quality, consumer satisfaction, decision time, and intention to use.

Background Knowledge

DSS and Web-Based DSS

The notion of decision support systems (DSS) is grounded in the concept of bounded rationality (Simon, 1960), which holds that the decision-making process is restricted due to limited human information-processing capability and time constraints. In order to alleviate these limitations and help decision makers to make effective decisions, practitioners and academic researchers began to develop and research DSS since the early 1970's (Sprague, 1980). DSS has evolved and proliferated at different stages from individual-oriented DSS in the 1970's; to executive information systems (EIS), group decision support systems (GDSS), and organizational DSS (ODSS) in the 1980's, to knowledge-based on-line analytical processing (OLAP) in the 1990's, and finally to Web-based DSS.

Although web-based DSS has caught the attention of researchers (Power, 1998; Power, 2000; Gachet, 2001; Bhargava & Power, 2001) lately, few studies have been focused on evaluating Web-based DSS (Power, 2000). Our preliminary search shows that the number of studies on evaluation Web-based consumer DSS are even fewer. Following on the definition provided by Windham & Orton (2000), we define consumer as a shopper who acts on behalf of his or her personal, rather than professional, needs.

Consumer Decision-Making Process

According to Simon (1960), there are three major phases in a decision process: intelligence, design, and choice. The intelligence phase involves collecting information. The design phase involves developing or searching alternatives. The evaluation of alternatives and the final selection are made in the choice phase. Researchers in marketing have conducted many studies on consumer decision-making process. For example, Windham & Orton (2000) proposed that in the purchasing processes, some phases are experienced by all consumers regardless of the types of products and services offered and, generally, there are six basic stages in an individual's purchase decision cycle (Figure. 1).

$$\boxed{\text{Stimulate}} \Rightarrow \boxed{\text{Consider}} \Rightarrow \boxed{\text{Search}} \Rightarrow \boxed{\text{Choose}} \Rightarrow \boxed{\text{Buy}} \Rightarrow \boxed{\text{Buy Again}}$$

Figure 1. Consumer Purchase Decision Cycle (Windham & Orton, 2000)

The process starts with the stimulate-stage, in which the consumer first discovers that he/she has a need, and there are ways to satisfy that need. Then, the consumer considers the alternative solutions and begins to search alternatives. Sometimes, search and consider stages are merged together. Next, the consumer decides which of the alternatives to buy. In the buy stage, the consumer makes the purchase transaction. Finally, the consumer repurchases when needed.

In this decision process, one thing worthy of note is that the purchasing process does not simply repeat the same stages every time a consumer makes a purchase. Rather, the process will become compacted. When the consumer buys the same or similar product/services again, he/she has the knowledge and experience of the purchase process, and may have a propensity to skip the search and other stages of purchase decision-making. This is also true of online shopping. When a consumer knows which website has the products or services, he/she might go to that site directly instead of checking other sites. In the same vein, Berndt (2001) divided the decision-making process of consumers in online shopping situation into information gathering, decision-making, and economic exchange.

Consumer Purchasing Criteria

Many factors influence consumers' choice of a product or service. When making a purchasing decision, a consumer usually simultaneously considers several factors such as price, features, quality, reputation of the seller/manufacturer, warranty and after-sale service. Consumers have different styles to make purchase decisions. Sproles (1985) defines consumer decision-making style as a mental orientation characterizing a consumer's approach to purchasing choices. In order to investigate the consumer purchasing style, researchers (Sproles and Kendall, 1986; Thorelli et al., 1975; Fan and Xiao, 1998) in the area of marketing and consumer psychology have examined several factors such brand consciousness (Which brand should be chosen?); quality consciousness (How important is the quality of the product?); price consciousness (How much should be paid for the product/service?); time consciousness (How much time should be spent on searching? Is the shopping time-saving and recreational?); and information utilization (How much information should be collected for a product or service? How much information is available?).

With regard to electronic commerce, Windham & Orton (2000) recognized that saving time and making daily activities more efficient are among the many factors that facilitate the acceptance of e-commerce applications.

WCDSS Conceptualization

Characteristics of Web-Based Consumer Purchasing Decision and Decision Support

The examination of the process that people undergo when making an on-line purchase helps to understand what WCDSS is, how a WCDSS works, and what a WCDSS can do. In a shopping from WCDSS supported website, a consumer's purchasing process is a "guided" process with regard to searching, locating, evaluating, and comparing. Consumers not only can receive recommendations on products, they can also control the level of online help and recommendations. The functionalities of WCDSS will be discussed further in the next section. There are some characteristics that differentiate WCDSS from other DSS. For instance, O'Keefe & McEachern (1998) proposed two such characteristics: the decision process being supported, and system users. They proposed that the decision process has five stages: need recognition, information search, evaluation, purchase, and after purchase evaluation. They also maintained that the users in a managerial DSS have fewer choices than the users of customer-DSS. They argued that the consumers could pick up any DSS from different shopping sites, and they could get similar information using other tools such as search engines, newsgroup, and market brokers. Based on literature review, some main characteristics of WCDSSS are identified and presented in Table 1.

Table 1. Characteristics of WCDSS

Aspects	WCDSS	Sources
Purpose	Help consumers decide what to buy by providing the most accurate, up-to-date and unbiased shopping information; improve customer service	**http://www.activeresearch.com** Power, 2000
Orientation	Make consumer online shopping focused, faster and more effective.	**http://www.activeresearch.com**
Human factors	External customers do not need special training for using the system. Instead, they are casual users, who will only infrequently use the system	O'Keefe & McEachern, 1998; Berndt, 2001.
Technical factors	1. Web-based thin clients, distributed technology. 2. Plug and play feature. No need of additional hardware or software. 3. Fully customized and Seamlessly integrated into a company's online shopping system. No need to design web pages and maintain the site. 4. Enhanced product display modality with powerful visual tools. 5. Scalable and Reliable	**http://www.activeresearch.com** O'Keefe & McEachern, 1998; Power, 2000
Settings	Anywhere with access to networked computer devices	Wood 2001

Definition of WCDSS

Although WCDSS has not yet been formally defined, some loose and implicit explanations have occasionally appeared in various publications in the industry. For instance, in an article of National Health Care Purchasing Institute (July 2001), WCDSS was described as an Internet-enabled self-service tool to help consumers identify, select, and enroll in the health plans most appropriate to their individual needs. These tools provide educational checklists, financial modeling, an ability to customize plan comparison, and links to quality information or help consumers to customize information. In a case study, Berndt (2001) described that while many database technologies are used to support electronic commerce, "consumer decision support systems offer an opportunity to provide valuable content in a controlled mostly-read environment." He contended that consumer decision support systems focus the power of data warehousing technologies on the two upstream phases of decision-making: information gathering and decision-making. These support consumers with detailed information and analytical capabilities in a way that was not feasible before the Internet or current data warehousing technologies became available.

In this study, we define WCDSS as the web-based systems or technologies that provide consumers with support in the online purchasing process. We view WCDSS as a variety or category in the DSS family. Our rationale is based on the three essential elements of DSS proposed by Mallach (2000): 1) Decision support systems are information systems, 2) Decision support systems are used in making decisions, and 3) Decision support systems are used to support, not to replace, people.

The Functionalities of WCDSS

O'Keefe & McEachern (1998) argues that what makes a customer support DSS different from a managerial support DSS is the decision process being supported. They developed a table framework based on two dimensions, with customer decision process as the vertical dimension and customer decision support systems (CDSS) and Internet facilities as the horizontal dimension. The decision process includes five stages: need recognition, information search, evaluation, purchase, and after purchase evaluation. In the framework, they attempted to match each decision stage with the facilities that can be provided by a CDSS and generic Internet facilities. Their framework is augmented in this study by adding one more decision stage, and by including additional features of the system not covered by prior framework. The expanded framework is presented in Table 2.

Basically, there are four reasons for us to extend the framework by O'Keefe & McEachern (1998). First, a framework based on detailed decision stages will provide more insight in understanding the decision process and provide more information because the mapping between the functions of WCDSS and decision process is more accurate. The stage added is "consider", which was explained in the previous section. Second, in the original study, the term "consumer" and "customer" were not defined, and were used interchangeably. We contend that these two terms are different, and that the differentiation is important in electronic commerce. A consumer is an individual who purchases for personal reasons; a customer can either be a business or an individual consumer. The importance of this differentiation lies in the fact that the functionalities of support system used in "business to business" and "business to consumer" are not always the same. For example, "Emptoris ePass" is used in "B2B", which provides customers a "sourcing solution that could take into account non-price factors, such as supplier reliability and performance" (**http://www.emptoris.com**). This study only focuses on the support of consumer in online purchasing setting. Third, some new technologies and features of Web-based DSS, which were not included in the original framework, were added and presented in italic in Table 2. Fourth, some examples of of applying WCDSS are provided, which enhances the understanding the functionalities of WCDSS.

Roughly, the functions of WCDSS in Table 2 can be grouped into five broad categories: 1. Communication-driven purpose: Live Internet service set to capture customers' attention (Waltner, 2000). Applications such as live text chat, co-browsing, and page pushing are all helping businesses retain and serve their customers. 2. Customized advanced search function: Mass customization is intended to provide superior value to customers by meeting their unique needs for products and services (Pine et al., 2000). It simplifies the time and effort people need to spend on their search. It was done by providing a "choice-board" or a menu of choices. 3. Recommendation purpose. For complex products like cars or computers, recommendations can be very useful. 4. Educational purpose. Educate the consumers with some knowledge and information they are lacking. 5. Shipment Tracking Purpose.

WCDSS is at its emerging stage. Researchers and designers are attempting a variety of methods to improve its performance (Ansari et al., 2000; Liechty et al., 2001; Dineley & Snyder, 2000). One application of WCDSS is Active Decisions' Sales Assistant, which is designed to "help consumers decide what to buy by providing the most accurate, up-to-date and unbiased shopping information" (**http://www.activeresearch.com/**). Researchers (Karacapilidis & Moraitis, 2001) predicted that future Web-based DSS would allow the handling of incomplete, inconsistent, and conflicting information, as well as the progressive synthesis and comparative evaluation of alternative proposals.

Table 2. A Revised Framework Using WCDSS to Support Consumer Purchasing

Process	Web Facilities	WCDSS	Examples
Needs discover	Banner advertising on other Web sites URL on physical material Discussions in newsgroups	Agents and event notification *Direct marketing with email*	Active Sales Assistant,
Consider		*Recommendation at the early stage based on customers' own preference;* *Customized, preference-based Navigation system.*	Active Sales Assistant, Youmeus,
Search	Web directories and classifiers External search engines Focused directories and information brokers	Virtual catalogs Internal search on Web site Structural interaction and question/answer sessions Links to (and guidance on) on external sources *Multi-attribute, multi-decision rule, intelligent search facility (by brand, feature, or price)* *Side-by-side comparisons by product feature match* Quick keyword search. *User-controlled search level allowing users to control over the level of detail they would like to see.* *Feature Glossary and sensitive help aided with mouse-move-over function*	Active Sales Assistant, PriceSCAN, mySimon
Choose	Discussions in newsgroups Cross site (i.e., firm) comparisons Generic models	FAQs and other summaries Samples and trial Provision of evaluative models Pointers to (and information on) existing customers *Buying advice on complex products and features;* *Personal preference match feature;* *Fuzzy recommendations provide products that are close to consumer's requirement, but might more fit with other criteria, which one did not realized.*	Active Sales Assistant, PriceSCAN, mySimon
Purchase	Electronic cash and virtual banking Logistic providers and package tracking *Security system*	Product or service ordering Payment methods Arrangement of delivery *Credit–card verification system*	
Post-buy evaluation	Discussions in newsgroups Email to friends	Customer support via email and a newsgroup Email communication and response *Email notification and follow-up system; Email to friends* *Recording personal purchasing information for future use.*	Active Sales Assistant, PriceSCAN, mySimon

The Effectiveness of WCDSS

The importance of research on the evaluation of IS success or effectiveness has been well documented by IS researchers. Sprague and Carlson (1982) pointed out that DSS evaluation not only helps decide which DSS to undertake and which to continue, but also quantifies the impact of decision-making processes on organizational goals. Delone and McLean (1992) also argued that if information systems research is to make a contribution to the world of practice, a well-defined outcome measure (or measures) is essential.

In the past several decades, a large number of studies have been conducted to identify the factors that contribute to information system effectiveness. Because of the multi-faceted nature of "IS effectiveness," researchers have examined different measures. In their summary research, Delone and McLean (1992) identified six categories of system success—*system quality, information*

quality, use, user satisfaction, individual impact, and *organizational impact.* Similarly, in the domain of DSS, researchers have examined such measures as user's overall satisfaction and decision-making satisfaction (Mahmood & Sniezek, 1989; Sanders & Courtney, 1985); DSS usage (Mykytyn, 1988); perceived benefits (Keen, 1981); and decision quality, performance, and business profitability (Aldag & Power, 1986; Benbasat & Dexter, 1982). Among these dimensions, user satisfaction and perceived advantages are widely accepted as the prime criteria of DSS success (Guimaraes et al., 1992).

As an extension of Delone and Mclean's study, Seddon (1997) argued that the measure of IS effectiveness should fit a particular context. They presented a framework, which is based on two dimensions: the type of system studied and the stakeholder in whose interests the system is being evaluated. This framework generated 30 different contexts that might call for different measures. More recently, Alter (1999) contended that the two-dimensional framework ignored the reality in understanding information system effectiveness. The reality is that information systems are increasingly becoming integral parts of other "work systems." It is impossible and meaningless to remove the information system from the "work system" and evaluate the information system alone. Alter (1999) used the "Siamese twins analogy" to describe the relationship between a "work system" and an information system that supports it. This "integral un-separateness" characteristic of an information system from the work system it supports increases the difficulty of evaluating the effectiveness of this web-based support system.

As discussed previously, WCDSS is seamlessly embedded in the online transaction processing system, which itself is an information system. Technically, these two systems overlap in some aspects such as user interface and data source. The better the system is integrated, the harder it is to differentiate them from each other. As the result, this overlap in interface causes difficulties in assessing the effectiveness of a WCDSS. Functionally, the online transaction processing part of a shopping system is the "work system" as described by Alter (1999), which should be recognized in the foreground. WCDSS is designed and developed to support consumers with the "right information" to the "right person" at the "right time" in the purchasing process. It is important, but it should be in a support position. This functional differentiation suggests that when it comes to evaluate the effectiveness of WCDSS, it is appropriate to be considered as a moderator, which should produce a positive moderating effect between the shopping system and system performance (Figure 2).
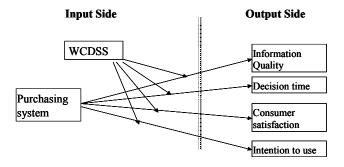

Figure 2. The Effectiveness of WCDSS

With WCDSS, consumers are supposed to have richer and more relevant information. The optimization and intelligent multi-attribute selection feature of WCDSS allow consumers to search more alternatives about the target product in a shorter time. Consequently, the consumers will be satisfied with their purchasing and continue to use the system for the next transaction. Based on these assumptions, we propose to assess the effectiveness of WCDSS on four dependent variables: (1) information quality, (2) decision time, (3) overall satisfaction, and (4) intention to use in the future.

Perceived Information Quality

Perceived information quality has been extensively studied in the research of system evaluation. Bailey & Pearson (1983) identified nine characteristics of information quality—accuracy, precision, currency, output timeliness, reliability, completeness, conciseness, format and relevance. In the e-commerce context, although consumers often experience information overload, they are often lacking useful and relevant information about a complex product. Besides, Kivetz & Simonson (2000) noted that a common problem consumers encountered is making a choice with incomplete information. When a consumer is making a purchasing decision based on incomplete information, there is a trust-risk kind of conflict involved. Literature suggests that information quality can have a substantial impact on consumer purchase decisions (Wang & Strong, 1996; Raghunathan, 1999; Kivetz & Simonson, 2000).

Consumers supported with WCDSS are supposed to make more rational purchasing choices through processing more information and evaluating more alternatives. Their decisions are based on more accurate, more personal related information. Hence:

> ***Proposition 1***: Consumers with WCDSS based purchasing support will perceive information quality better than those without such support.

Decision-Making Time

DSS affects the decision-process by facilitating decision-makers to make their choice faster, thereby improving the decision-making efficiency. Decision-making time used as a criterion to evaluate a DSS can be found in many previous studies (Benbasat & Dexter, 1982; Parikh et al., 2001). Similarly, a WCDSS can reduce the purchasing decision time in at least two ways. First, the intelligent searching engines make it possible to search more alternatives in a shorter time. Second, the preference-based recommendation system can present the relevant information to the consumer directly, thus streamlining the customers' random searching effort and shortening the purchase decision time. Hence:

> ***Proposition 2***: Consumers with WCDSS based purchasing support will make purchase decisions faster than those without such support.

User Satisfaction with the Shopping Process

In IS literature, user satisfaction is widely used as a measure for system success or effectiveness (Melone, 1990; Galletta & Lederer, 1989). The major dimensions of user information satisfaction (Baroudi & Orlikowski, 1988) were identified as: (1) the quality of information products produced by the Information Service Function (ISF); (2) the level of the user's knowledge and involvement in system development and ISF activities; (3) the user's attitude towards ISF staff and services. With regard to decision support systems, satisfaction has been studied in terms of both process and outcome (Dennis et al., 1996; DeSanctis & Gallupe, 1987; Pinsonneault & Kraemer, 1989).

Generally, user satisfaction measures the extent to which a product or service meets the needs of users or consumers for whom the product or service was designed (Conca, 2001). Consumers need products, services, and systems that can save time and enable daily activities to be performed more efficiently. If consumers can achieve what they expected, they will be satisfied and continue to use the system. Previous study found that among the many factors that facilitate the acceptance of e-commerce applications, the critical ones include the features that can save shopping time and provide secured payment environment to consumers (Windham & Orton, 2000).

Because WCDSS is designed to improve the consumers' shopping process with functions such as presented in Table 2, it supposed to satisfy consumers in their purchasing process. Hence:

> ***Proposition 3***: Consumers with WCDSS based purchasing support are more satisfied with the shopping process than those without such support.

Intention to Use

Intention to use is a criterion used to predict the extent to which the system user will continue to use the system in the future. Intention to use has been an important construct in the research on the technology acceptance model (Davis, 1989). According to the theory of reasoned action, the consumers' perception and attitude to a system is likely to influence his/her behavioral intention to use the system. If a system can meet the consumers' information requirements, they are believed to hold a positive or favorable attitude toward the system (Ives et al., 1983). Hence, it is reasonable that satisfied consumers with a system will have a positive attitude toward the system, which will in turn produce a positive impact on the intention to use the system. Research in other area already found that satisfied customers will purchase more and refer new customers (Evans and Landsay, 1999). For practitioners, whether the WCDSS can make consumers continue to use the system is important because it is the ultimate purpose of WCDSS development and implementation. Hence:

> ***Proposition 4***: Consumers with WCDSS based purchasing support are more likely to have higher intention to use the system in the future than those without such support.

Conclusion

With the widespread acceptance of online shopping systems, Web-based consumer purchasing decision support has caught the increased attention of researchers and developers. As a variant of the DSS, WCDSS is designed and developed to improve the consumers' purchasing experience by providing them with more relevant, complete, and richer information about a target product so that they can make a better and faster purchasing decision. This study mainly addressed WCDSS from two aspects. First, it conceptualized WCDSS in terms of definition, characteristics, and functionalities. Second, this study discussed the effectiveness of the WCDSS and proposed to assess the effect of WCDSS on perceived information quality, decision time, consumer satisfaction, and intention to use in the future. While it is important to conceptualize WCDSS and recognize its effectiveness, empirical evaluations are useful to enhance the understanding of WCDSS and the extent of its effectiveness. Future studies may focus on testing these propositions presented in this paper.

The contributions of this study are expected to be: 1. Theoretically, this study expands the research scope of DSS to individual consumer domain. Generally, DSS for management has been extensively studied (Sprague and Watson, 1996); while, the research of DSS for personal purchasing decision is relatively rare. 2. From the perspective of DSS providers and developers, a study on WCDSS will help them explore new opportunities and identify potential markets (Bhargava et al., 1997). Traditionally, DSS technology is a stand-alone system or application, serving a small group of computer users, mainly engaged in decision making and knowledge management activities in organizations. The "broad" or "mass" usage of these decision technologies has not yet received enough attention. However, the examples in this study show that DSS can serve and be used by everyone, not just managers. 3. From the perspective of e-businesses, the examination of the functionalities and capability of WCDSS gives some suggestions for e-businesses on how to leverage WCDSS to improve the consumers' on-line shopping experience and satisfaction. 4. From the perspective of individual consumers who purchase on-line, the awareness and the subsequent usage of WCDSS can improve purchasing quality and shorten the purchasing time.

References

Aldag, R. J. and Power, D. J. "An Empirical Assessment of Computer-assisted and Decision Analysis," *Decision Sciences*, 17(4), 1986, p.572-588.

Alter S. "The Siamese Twin Problem: a Central Issue Ignored by 'Dimensions of Information System Effectiveness,'" Letter to the Editor appended to Seddon et al, 1999, pp.40-55. **http://cais.isworld.org/articles/2-20/**.

Ansari, A., Essegaier, S., and Kohli, R., "Internet Recommendation Systems," *Journal of Marketing Research*, 37(3), 2000, p.363-375.

Bailey, J. E. and Pearson, S. W. Development of a Tool for Measuring and Analyzing Computer User Satisfaction, *Management Science*, 29 (5), 1983, p.530-545.

Baroudi, J. J. and Orlikowski, W. J. "A Short-form Measure of User Information Satisfaction," *Journal of Management Information Systems*, 4(4), 1988, pp.44-59.

Benbasat, I. And Dexter, A. S. "Individual Differences in the Use of Decision Support Aids," *Journal of Accounting Research*, 20(1), 1982, pp.1-11.

Berndt, D. J. "Consumer Decision Support Systems: A Health Care Case Study," *Proceedings of the 34th HICSS*, 2001.

Bhargava, H. K., Krishnan, R., and Müller, R., "Decision Support on Demand: Emerging Electronic Markets for Decision Technologies," *Decision Support Systems,* 19(3), 1997, p.193-214.

Bhargava, H. K., and Power, D. J. "Decision Support Systems and Web Technologies: A Status Report," *Proceedings of the Seventh Americas Conference on Information Systems*, Boston, Aug. 2001.

Conca, C. "Capturing and Comparing Objectively and Subjectively Determined Decision Models in User Information Satisfaction Judgment Formation," *Journal of Computer Information Systems*, 42(1), Fall 2001, pp. 97-103.

Davis, F. D. "Perceived Usefulness, Perceived Ease Of Use, And User Acceptance," *MIS Quarterly*, 13(3), 1989, pp. 319-340.

Delone, W. H. and McLean, E. R. "Information System Success: the Quest for the Dependent Variable," *Information Systems Research*, 3(1), 1992, pp.60-96.

Dennis, A.R., Haley, B.J., and Vandenberg, R.J. "A Meta-analysis of Effectiveness, Efficiency, and Participant Satisfaction in Group Support Systems Research," *Proceedings of the ICIS*. Cleveland, Ohio, 1996, p 851-863.

DeSanctis, G., and Gallupe, R.B. "A Foundation for the Study of Group Decision Support systems," *Management Science*, (33:5), 1987, p.589-609.

Dineley D. and Snyder, J. "Customer Service Meets the Web," *InfoWorld*, 22(14), Apr 3, 2000, pp.89-96.

Evans J.R. and Lindsay W.M. The Management and Control of Quality, (4th ed). *South-Western College Publishing*, Cincinnati, OH. 1999.

Fan, J. X., and Xiao, J. J. "Consumer Decision-making Styles of Young-Adult Chinese," *The Journal of Consumer Affairs*, (32:2), 1998, p 275-294.

Gachet A., "A Framework for Developing Distributed Cooperative Decision Support Systems – Inception Phase," *Informing Science Conference*, June 19-22, 2001, Kraków, Poland.

Galletta, D. F. and Lederer, A. L. "Some Cautions on the Measurement of User Information Satisfaction," *Decision Sciences*, 20(3), 1989, p.419-438.Guimaraes, T, Igbaria, M. and Lu M., "The Determinants of DSS Success: An Integrated Model," *Decision Sciences*, 23(2), 1992, p409-31.

Karacapilidis, N. and Moraitis, P. "Building An Agent-Mediated Electronic Commerce System with Decision Analysis Features," *Decision Support Systems* 32 (1), 2001, pp.53-69.

Keen, P. G. W. "Value Analysis: Justifying Decision Support Systems," *MIS Quarterly*, 5(1), 1981, pp.1-16.

Kivetz, R. and Siminson I. "The Effects of Incomplete Information on Consumer Choice," *Journal of Marketing Research*, 37(4), 2000, pp.427-448.

Liechty, J. Ramaswamy, V. and Cohen, S. H., "Choice Menus for Mass Customization: An Experimental Approach for Analyzing Customer Demand with an Application to a Web-based Information Service," *Journal of Marketing Research*, 38(2), 2001, p183-196.

Mallach, E. G., Decision Support and Data Warehouse Systems, *Irwin McGraw-Hill*, 2000. P11-12.

Mahmood, M. A., and Sniezek, J. A. "Defining Decision Support Systems: An Empirical Assessment of End-user Satisfaction," *Information Systems & Operational Research* (INFOR), 27(3), 1989, pp.253-271.

Melone, N. P. "A Theoretical Assessment of the User-satisfaction Construct in Information Systems Research," *Management Science*, 36 (1), 1990, pp.76-91.

Mykytyn, P. P. "End-user Perceptions of DSS Training and DSS Usage," *Journal of Systems Management*, 39 (6), 1988, pp.32-35.

O'Keefe, R.M., and McEachern, T., "Web-based Customer Decision Support Systems," *Communications of the ACM*, 41(3), 1998, p71-78.

Parikh, M., Fazlollahi, B., and Verma, S., "The Effectiveness of Decisional Guidance: An Empirical Evaluation," *Decision Sciences*, 32 (2), 2001, p303-331.

Pine, B. Joseph, , Markets of One: Creating Customer-Unique Value Through Mass Customization, Boston, Mass.: *Harvard Business School Press*, 2000.

Pinsonneault, A., and Kraemer, K.L. "The Impact of Technological Support on Groups: An Assessment of the Empirical Research," *Decision Support Systems*, 5(2),1989, pp.197-216.

Power, D.J. "Web-based Decision Support Systems," *DSstar (Online Executive Journal for Data-Intensive Decision Support)*, 2(33), 1998.

Power, D.J. "Web-based and Model-Driven Decision Support Systems: Concepts and Issues," *Proceedings of AMCIS 2000,* CA.

Raghunathan, S. "Impact of Information Quality and Decision-maker Quality on Decision Quality: A Theoretical Model and Simulation Analysis," *Decision Support Systems*; 26(4), Oct 1999, pp. 275-286.

Sanders, L. G. & Courtney, J. F. "A Field Study of Organizational Factors Influencing DSS Success," *MIS Quarterly*, 9(1), 1985, pp.77-93.

Seddon, P.B. "A Respecification and Extension of the Delone and McLean Model of IS Success," *Information Systems Research,* 8(3), 1997, p 240-254.

Simon, H. A., The New Science of Management Decision, New York: *Harper & Row*, 1960.

Sprague, R. H. "A Framework for the Development of Decision Support Systems," *MIS Quarterly*, 4, 1980, pp.1-26.

Sprague, R. H., and Carlson, E. D. Building Effective Decision Support Systems, Englewood cliffs, NJ: *Prentice-Hall, INC*, 1982.

Sprague, R. H., and Watson, H. J. Decision Support for Management, *Prentice Hall*, 1996.

Sproles, G. B. "From Perfectionism to Fadism: Measuring Consumers' Decision-making Styles," *The Journal of Consumer Affairs*, 20(2), 1985, p267-279.

Sproles, G. B., and Kendall, E. L., "A Methodology for Profiling Consumers' Decision-making Styles," *The Journal of Consumer Affairs*, (24:1), 1986, pp.134-147.

Thorelli, H. B., Becker, H., and Engeldow, The Information Seekers, Cambridge, MA: *Ballinger*, 1975.

Waltner, C., "Live Internet Service Set to Capture Customer Attention," *InformationWeek*, Issue 815, 2000, p.174-180.

Wang, R. Y. and Strong, D. M., "Beyond Accuracy: What Data Quality Means to Data Consumers," *Journal of Management Information Systems*, (12:4), 1996, pp. 5 – 33.

Windham L. and Orton K. The Soul of the New Consumer—The Attitudes, Behaviors, and Preferences of E-Customers. New York: *Windsor Books Ltd*., 2000. p2.

Wood, S. L. "Remote Purchase Environments: The Influence of Return Policy Leniency on Two-Stage Decision Processes," *Journal of Marketing Research*, 2001, pp. 157-169.