A CONJOINT ANALYSIS OF ONLINE CONSUMER SATISFACTION[1]

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ABSTRACT

The ability to measure the level of customer satisfaction with online shopping is essential in gauging the success and failure of e-commerce. To do so, Internet businesses must be able to determine and understand the values of their existing and potential customers. Hence, it is important for IS researchers to develop and validate a diverse array of metrics to comprehensively capture the attitudes and feelings of online customers. What factors make on-line shopping appealing to customers? What customer values take priority over others? This study's purpose is to answer these questions, examining the role of several technology, shopping, and product factors on online customer satisfaction. This is done using a conjoint analysis of consumer preferences based on data collected from 188 young consumers. Results indicate that the three most important attributes to consumers for online satisfaction are privacy (technology factor), merchandising (product factor), and convenience (shopping factor). These are followed by trust, delivery, usability, product customization, product quality, and security. Implications of these findings are discussed and suggestions for future research are provided.

Keywords: Online customer satisfaction; E-satisfaction; Conjoint analysis; E-commerce; E-commerce metrics

1. Introduction

Internet commerce involves the sale and purchase of products and services over the Internet [Keeney 1999]. It was touted to have massive sales potential, with previous expectations of over $1 trillion by 2002 [Burke 1997; Mehler et al. 1997]. Yet, these expectations have fallen well short of the $1 trillion estimate, with the U.S. Census Bureau reporting that U.S. e-commerce sales in 2002 equaled only $43.5 billion and $70 billion in 2003. However, online spending is on the rise. Retail e-commerce sales in the second quarter of 2004 were approximately $15.7 billion, an increase of 23.1 percent from the second quarter of 2003 (U.S. Census Bureau 2003). E-commerce sales in the second quarter of 2004 accounted for 1.7 percent of total sales, while in the second quarter of 2003 e-commerce sales were 1.5 percent of total sales (U.S. Census Bureau 2003).

Given the continual rise in online spending and its increasing influence on total retail sales in the U.S. further exploration of per person spending patterns is warranted. Clearly, consumers must be satisfied with their e-commerce shopping experience to acquire more goods and services on-line. Given the need to understand what users want in a Web site [Straub & Watson 2001], it is important for IS researchers to develop and validate a diverse array of metrics to comprehensively capture the attitudes and feelings of online customers. What factors make on-line shopping appealing to customers? What customer values take priority over others? This study's purpose is to answer these questions, examining the role of several technology, shopping, and product factors using a conjoint analysis of consumer preferences to measure online customer satisfaction (e-satisfaction).

Metrics for assessing the customer satisfaction level of online shopping are essential in gauging the ultimate success or failure of e-commerce. Different customers may disagree about their perceptions and satisfaction level for a particular Web site. An experienced online customer may find his or her experience to be very enjoyable and fulfilling. The experienced online shopper is more likely to have an easier time navigating the site, searching for information on particular products, as well as ordering on-line. Shopping via the Internet is salient in this experienced customer's mind because of past experiences with the use of technology. This experienced shopper

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may be more likely to leave the Website with a feeling of satisfaction, granted the purchases arrive in a timely manner, and receiving the product is hassle free. Another shopper, new to the process of shopping online, may find it difficult and impersonal. Different customers will consider different costs and benefits in appraising the net value of prospective Internet purchases [Keeney 1999]. As a result, it is imperative that the beliefs and expectations of the consumer are noticed and met by Internet businesses. In order to measure customer satisfaction level, accurate metrics must be in place.

2. Background

Many articles on business-to-consumer (B2C) e-commerce focus on experiences of one or a couple of organizations, describing organizational experiences in deploying B2C websites [Chen et al. 2003; Dahle 1997; El Sawy et al. 1999; Starne 1997; Stuart 1999]. There has also been extensive research focused on reporting the existing status of B2C e-commerce [Fruhling & Digman 2000; Ho 1997; U.S. Department of Commerce 1999], as well as research done to forecast future trends and providing general guidelines for designing and managing B2C websites [Calkins et al. 2000; Gogan 1996-97; Morris & Hinrichs 1996]. These studies have touted various characteristics as being important factors to an effective B2C e-commerce website, but there is presently no unified view of how this affects online customer satisfaction.

Studies of the use of the Internet for commercial purposes are varied. Liu et al. [1997] examined the web sites of Fortune 500 companies to identify how they are using the web for interacting with their customers. Ho [1997] examined 1800 websites from various industries across several countries. Hoffman et al. [1996] created six categories for classifying commercial web sites: online storefront, Internet presence, content, mall, incentive site, and search agent. Others classify online shopping stores as superstores, promotional stores, sales stores, one-page stores, and product listings [Spiller & Lohse, 1997]. Liu and Arnett [1998] proposed a framework for designing quality B2C websites. Hoffman et al. [1996] analyzed case studies to recommend several measures for improving B2C Websites. All of these aforementioned studies have taken the organization's perspective and offered guidelines for conducting B2C e-commerce. Jarvenpaa and Todd [1997] suggested that Internet merchants focus on factors affecting human behavior: product perceptions, shopping experience, and customer service. Szymanski and Hise [2000] examined e-satisfaction from the consumer's perspective and found that convenience, site design, and financial security displayed the greatest effect on e-satisfaction. Ranganathan and Ganapathy [2002] took the consumers' perspective and offered guidelines for online merchants to have an effective site based on four dimensions: information content, design, security, and privacy. There have also been numerous studies of e-commerce adoption, described in later paragraphs.

This study extends the e-satisfaction literature by building on previous work to develop a comprehensive conceptual model of e-satisfaction. In contrast to other studies, this research takes a more comprehensive look at the determinants of e-satisfaction as a whole by forcing the consumer to assess Internet commerce as a whole. It also provides a more realistic view of the consumer's online decision making process by having the respondent make an overall evaluation of several measures of online shopping attributes concurrently, taking into consideration that choices cannot all be maximized.

3. Conceptual Model

Literature on online consumer satisfaction and values reveals several antecedents to online customer satisfaction. For example, convenience, site design, and financial security affect e-satisfaction [Szymanski & Hise 2000]. Of the many other features discussed [Buskin 1998; Ernst & Young 1999], we selected three categories of factors as key to influencing e-satisfaction: technology, shopping, and individual product factors. While there are other factors, conjoint analysis requires us to keep a relatively parsimonious model, and these three categories are most often mentioned in the literature, and are directly related to consumers' interactions with Internet businesses. The technology factors deal with the website qualities that ensure functionality of the site acknowledging that the consumer must be able to access the site, and be able to use it in order to purchase. Shopping factors deal with aspects of the consumer's feelings during and after the shopping experience. Product factors pertain to the qualities of the product or service for sale. These three categories, which comprehensively capture consumers' interaction with the technology, the online shopping experience, as well as the actual product (or service) purchased, are depicted in Figure 1. Variables in each category, identified in a pilot study, are described further below.

Online Consumer Satisfaction (E-satisfaction)

Customer satisfaction is critical for establishing long-term client relationships [Patterson et al. 1997] and, consequently, is significant in sustaining profitability. As a result, a fundamental understanding of factors impacting online customer satisfaction is of great importance to e-commerce [McKinney et al. 2002]. Customer satisfaction is the consequence of experiences during various purchasing stages: (1) needing something, (2) gathering information

about it, (3) evaluating purchasing alternatives, (4) actual purchasing decision, and (5) post purchasing behavior [Kotler 1997]. During information gathering, the Internet offers consumers extensive benefits, because it reduces search costs, increases convenience, vendor choices, and product options [Alba et al. 1997; Bakos 1998]. However, online consumers are dependent upon the Website information as a replacement for physical contact with salespersons [McKinney et al. 2002]. As a result, consumers make inferences about the attractiveness of a product based on: (1) information provided by retailers, and (2) design elements of the Website such as ease and fun of navigation [Wolfinbarger & Gilly 2001].
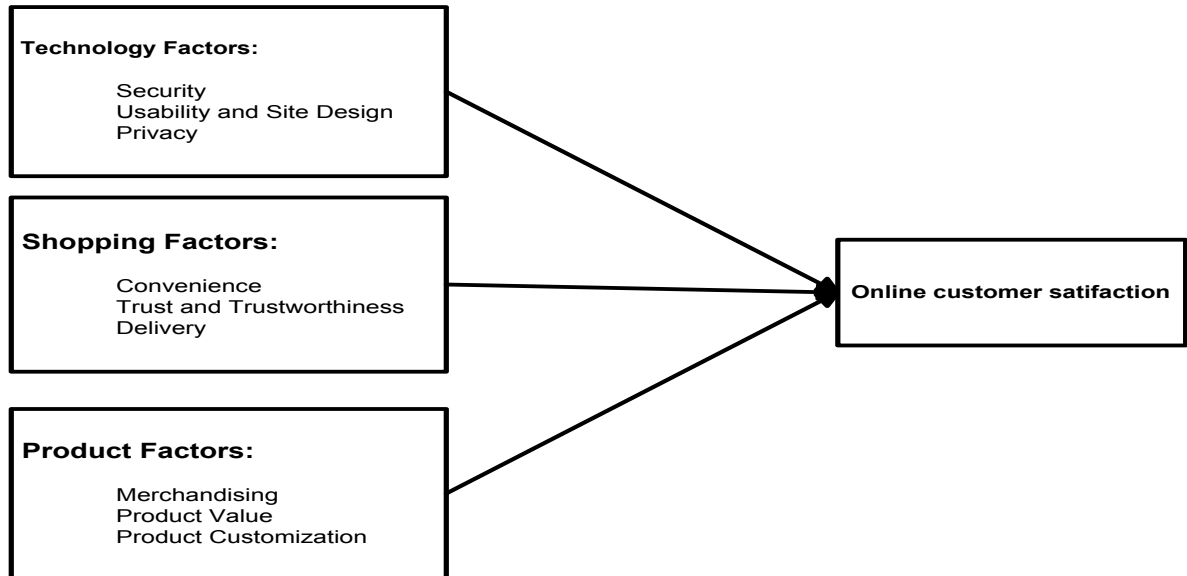

Figure 1: Conceptual Model

Technology Factors

Technology factors include the qualities of a website that ensure functionality of the site, including: security, privacy, and usability/site design [Jarvenpaa & Todd 1997; Keeney 1999; Palmer & Griffith 1998; Rasmussen 1996; Torkzadeh & Dhillon 2002]. Technology factors deal with the consumer's perceptions of their interaction with the B2C website and the Internet merchant responsible for that website. Three features of each attribute (security, privacy, and usability/site design) will be evaluated using a conjoint analysis to get a preferred feature within each attribute as well as determining an overall ranking of each attribute, including an overall importance score (see Table 1).

Security

Kalakota and Whinston [1996] define a security threat as a circumstance, condition, or event with the potential to cause economic hardship to data or network resources in the form of destruction, disclosure, modification of data, denial of service, and/or fraud, waste, and abuse. Despite the fact that security positively influences intention to purchase online [Ranganathan & Ganapathy 2002; Salisbury et al. 1998], it remains one of the major concerns [Kiely 1997; Mardesich 1999; Mayer et al. 1995]. Many consumers are still reluctant to release payment card information to online merchants, fearing a loss of control over their accounts. Merchants and financial institutions, in turn, are concerned about the costs associated with online chargebacks and fraud. To alleviate customers' fears, many B2C Websites offer alternate forms of payment (e.g. telephone ordering) and/or accounts with ID's and passwords [Ranganathan & Ganapathy 2002]. Bélanger et al. [2002] found that the presence of security features on an e-commerce site was important to consumers, and discuss how consumers' security concerns may be addressed by similar technology protections as those of the business, such as encryption and authentication. In this study, the features evaluated within the attribute of security include: (1) whether the site provides encryption, (2) whether the site requires the user to set up an account with an ID and password, and (3) whether a confirmation screen is displayed after the completion of the purchase to ensure accuracy.

Privacy

Privacy in e-commerce is defined as the willingness to share information over the Internet that allows for the conclusion of purchases [Bélanger et al. 2002]. B2C Web sites gather information about visitors via explicit modes (e.g. surveys) and implicit means (e.g. cookies) [Patterson et al. 1997], providing the necessary data for decision making on marketing, advertising, and products. However, many users have concerns over potential misuse of personal information [Brown & Muchira 2004; Hair et al. 1995; Ranganathan & Ganapathy 2002; Torkzadeh & Dhillon 2002]. For example, a Business Week/Harris poll of 999 consumers in 1998 revealed that privacy was the biggest obstacle preventing them from using Websites, above the issue of cost, ease of use, and unsolicited marketing [Green et al. 1998]. An IBM Multi-National Consumer Privacy survey in 1999 showed that 80% of the U.S. respondents felt that they had lost all control over how personal information is collected and used by companies. Seventy-eight percent had refused to give information because they thought it was inappropriate in the circumstance, and 54% had decided not to purchase because of concerns over the use of their information collected during the transaction [Bélanger et al. 2002]. A study by Forrester Research supports these findings, showing that two-thirds of consumers are worried about protecting personal information online [Branscum 2000]. To address issues of privacy, many Websites display privacy policies [McGinity 2000]. Also, independent companies (e.g. TRUSTe) can verify, audit, and certify privacy policies [Ranganathan & Ganapathy 2002]. In this study, the features evaluated within the attribute of privacy are: (1) the use of a privacy statement, (2) the merchant's policy on selling customer information to third parties, and (3) the use of cookies to collect personal information.

Usability/Site Design

Navigation, product information, and site design are critical to e-satisfaction [Szymanski & Hise 2000]. Thus, a key to building a usable Website is to create good links and navigation mechanisms Mannix 1999; Radosevich 1997). An advantage of the Internet is its capacity to support interactivity for users [Palmer 2002], and online consumers are influenced by the interactivity of the Website [Alba et al. 1997; Jarvenpaa & Todd 1997]. Fast, interactive, uncluttered, and easy-to-navigate sites with quality searching capabilities should be perceived more favorably by consumers. The features evaluated within the attribute of usability and site design are: (1) providing a user-friendly interface, (2) an interactive site, and (3) possessing adequate searching capabilities.

Shopping Factors

Shopping factors focus on customers' feelings and perceptions during and after the shopping experience. Factors determining this include convenience, trust and trustworthiness of Web merchants, and delivery time [Bélanger et al. 2002; Keeney 1999; Nielsen 2000 Patterson et al. 1997; Torkzadeh and Dhillon 2002]. The prototypical online consumer leads a wired lifestyle and is time starved, suggesting that online shoppers may do so to save time [Bellman et al. 1999]. This indicates that the overall convenience of the shopping experience is very important as well as the amount of time it takes for the product to be received. Trust is of importance during the actual shopping experience because if the consumer does not trust the merchant to make good on their purchase a transaction will not take place. Three features of each attribute (convenience, trust, and delivery) will be evaluated using a conjoint analysis to get a preferred feature within each attribute as well as determining an overall ranking of each attribute, including an overall importance score (see Table 1).

Convenience

Convenience is often found to be the most important determinant in retail store patronage and many forms of shopping such as catalog and Internet shopping [Berkowitz et al. 1999; Cox & Rich 1964; Ernst & Young 1999; Gillett 1970; Kalakota & Whinston 1996]. E-commerce gives an individual the opportunity to economize on time and effort by making it easy to locate merchants, find items, and procure offerings [Balasubramanian 1997]. Researchers identify convenience as a 'fundamental objective' related to online shopping [Keeney 1999; Torkzadeh & Dhillon 2002). B2C sites should be designed so that consumers minimize time finding the product or information (Ranganathan & Ganapathy 2002). Web sites should therefore make it more convenient to buy standard or repeat purchase items (such as Amazon's one-click-to-purchase approach). Convenience includes the overall ease of finding a product, time spent on shopping, post purchase service, complete contact information, and minimization of overall shopping effort. The features evaluated for convenience will include: (1) overall ease and fun of the shopping experience, (2) post purchase customer service, and (3) ability to look up detailed product information and to make price comparisons.

Trust and Trustworthiness

Trustworthiness is the perception of confidence in the e-marketer's reliability and integrity [Bélanger et al. 2002]. Buying decisions are partly based on trust in the product, salesperson, or company [Hosmer 1995]. Internet shopping decisions involve trust between customers and merchants, and their computer systems [Lee & Turban 2001]. Prior research has identified and validated many elements of trustworthiness, such as ability, benevolence, and integrity [Lee & Turban 2001; Manes 1997; Van Slyke et al. 2004]. The ability of a merchant is reflected in its

ability to handle sales transactions, and the expertise to generally conduct business over the Internet [Bélanger et al. 2002]. The consumer must have faith in the ability of the merchant and their system. Integrity is evidence of the Internet business's honesty and sincerity. For trust to exist, the online consumer must perceive the Internet business as being reliable and as having integrity. In this study, the features evaluated within the attribute of trust/trustworthiness are: (1) the customer's faith in the merchant and their computer system, (2) the Internet merchant's perceived reliability and integrity, and (3) the overall minimization of the customer's worries and regrets.

Delivery Time

Delivery time is the total time between order placement and delivery, which includes: dispatch, shipping, and delivery. Dispatch is the amount of time necessary for an order to go from initial order placement to being shipped out. During shipping the purchase is in transit from the merchant's warehouse to the shipping company's distribution facility. Delivery is the amount of time necessary for the package to go from the distribution center to the customer's door. Customers must be made aware of delays to minimize disappointment when the delivery date isn't met. Satisfaction is partially dependant upon expectations being met. The features of the attribute delivery time to be evaluated are: (1) overall minimization of delivery time, (2) the customer being made aware of any potential delays in shipping, and (3) providing customers a tracking number for their shipment.

Product Factors

Product factors pertain to the qualities of the product or service for sale. Often, products purchased online are no different than those purchased at brick and mortar stores. Customers choose between competing products depending upon which offer the best value [Keeney 1999]. Factors determining this include merchandising, overall product value, and availability of product customization [Jarvenpaa & Todd 1997; Keeney 1999; Szymanski & Hise 2000; Torkzadeh & Dhillon 2002; Zhu & Kraemer 2002]. Product factors deal with consumers' perceptions of the actual product being purchased. Three features of each attribute (merchandising, product value, and customization) will be evaluated using a conjoint analysis to get a preferred feature within each attribute as well as determining an overall ranking of each attribute, including an overall importance score (see Table 1).

Merchandising

Merchandising is defined as the factors associated with selling offerings online separate from site design and shopping convenience [Szymanski & Hise 2000]. Jarvenpaa and Todd [1997] found that consumers were impressed by the breadth of stores on the Internet, but were disappointed with the depth of a merchant's offerings. Merchants who have offered a wide variety of products and selections seem to be more successful (e.g., The Internet Shopping Network with 27,000 different computer and software items; CDNow with 112,000 different titles) [Jarvenpaa & Todd 1997]. Even beyond offering a broad product selection, Kalakota and Whinston [1996] argue that e-commerce should offer consumers the opportunity to make requests for products that are difficult to get via traditional channels. Jarvenpaa and Todd [1997] claim that it may be that consumers expect e-commerce to offer a wider product variety because of the reach of the Internet and the potential to track down specialty goods and services. Superior product assortment results in positive perceptions of customer satisfaction [Szymanski & Hise 2000], especially if the customer wants an item that isn't widely available. The features of the merchandising attribute to be evaluated are: (1) offering extensive product assortment and variety, (2) offering exclusive and specialty products, and (3) offering seasonal products.

Product Value

Minimizing product cost and maximizing product quality are major factors in e-commerce success [Keeney 1999]. Total cost includes product cost, taxes, shipping, Internet, and travel costs [Keeney 1999]. Quality is an intrinsic property of a product. Product quality is the expected standard of product or service excellence [Jarvenpaa & Todd 1997]. Brands and retailers that are well known and well regarded from the traditional channels may translate to quality on an online channel. The question becomes how consumers will assess product quality when they are unfamiliar with the retailer or the product brand [Jarvenpaa & Todd 1997]. Kalakota and Whinston [1996] stress the need to provide independent evaluations of goods and services to convince consumers of the quality of the merchandise sold by the Internet merchant on the web. Thus, the end result for the consumer should be a feeling of gratification with the purchase once completed. Torkzadeh and Dhillon [2002] combine these two objectives (product cost and product quality) into an Internet product value measure (used in this study). The features of the product value attribute to be evaluated are: (1) post purchase feeling of customer gratification, (2) perceived product quality, and (3) overall product cost.

Product Customization

Product customization is the users' ability to customize products according to personal preferences [Zhu & Kraemer 2002]. For example, configuring a computer and related product features directly on a merchant's Website. Customization is one of the great advantages of online shopping [Van Slyke et al. 2004], allowing what

some have termed a segment of one, where each customer is unique in his or her tastes, choices, and acquisitions. The features of the product customization attribute to be evaluated in this study are: (1) offering a customizable product, (2) offering online configuration capabilities, and (3) the number of options that are available for the product.

Table 1. Summary of Research Questions

Category	Research Questions
Technology	**1.** Which security feature among encryption, ID's and passwords, and order confirmation screens is perceived as more important by consumers in affecting their satisfaction?
	2. Which privacy feature among a privacy statement, the merchant's policy on selling customer information, and the use of cookies is perceived as more important by consumers in affecting their satisfaction?
	3. Which usability/site design feature among a user-friendly interface, an interactive site and adequate searching capabilities is perceived as more important by consumers in affecting their satisfaction?
Shopping	**4.** Which convenience feature among the overall ease and fun of the shopping experience, post purchase service, and price comparisons/ product information available from the site is perceived as more important by consumers in affecting their satisfaction?
	5. Which trust/trustworthiness design feature among the customer's faith in the merchant and their system, the e-marketer's perceived reliability and integrity, and the minimization of the customer's worries and regrets is perceived as more important by consumers in affecting their satisfaction?
	6. Which delivery feature among the minimization of delivery time, the customer being made aware of delays, and providing the customer with a tracking number is perceived as more important by consumers in affecting their satisfaction with online shopping?
Product	**7.** Which merchandising feature among offering an extensive product assortment and variety, offering exclusive and specialty products and offering seasonal products is perceived as more important by consumers in affecting their satisfaction?
	8. Which product value feature among providing a post purchase feeling of customer gratification, perceived product quality, and overall cost of the product is perceived as more important by consumers in affecting their satisfaction?
	9. Which product customization feature among offering a customizable product, offering online configuration capabilities, and the number of options available for a product is perceived as more important by consumers in affecting their satisfaction?

Engaging in e-commerce involves a complex decision making process. Consumers have to take into consideration various factors, which are summarized in Table 2. Yet, they can't maximize all factors. For example, will a consumer be satisfied with a Web merchant that provides no security through encryption but has a nice privacy policy? Conversely, will the consumer be satisfied with a merchant that has a strict security system that logs everything customers do, infringing on their privacy?

One methodology useful to analyze such trade-offs in consumer decision-making is Conjoint Analysis (CA) [AMA 2000] which is fairly new to e-commerce research. Conjoint analysis is a multivariate technique used to estimate or determine how respondents develop preferences [Hair et al. 1998]. The technique has been used in IS research before. Bajaj [1998] presents a conjoint analysis that views competing architectures as a product class, and compares the effects of various attributes in the decision models of senior IS managers when evaluating these alternative architectures. The basic requirement for using the conjoint analysis methodology for an IS research question is that a product class be created for the IS that is under question. The advantage of conjoint analysis is that it provides information about bundles of attributes. It therefore enables IS researchers to evaluate online consumer preferences by examining the examining the attributes that are the most or least important. In this study, the decision is the prioritization of e-satisfaction values and the product classes that are created, which include three underlying e-satisfaction categories: technology, shopping, and product factors. Within these three categories there are three variables in each, and each individual variable has three levels (measures).

Methodology

Conjoint Analysis is a research technique used to estimate or determine how respondents develop preferences for products or services, and to measure the trade-offs people make when making a decision [Hair et al. 1995]. Conjoint analysis is based on the premise that subjects evaluate the value or utility of a product/service/idea (real or

hypothetical) by combining the separate amounts of utility provided by each attribute, in this study e-satisfaction values. Conjoint analysis is a decompositional technique, because a subject's overall evaluation (preference) is decomposed to give utilities for each predictor variable, and for each level of a predictor variable. Conjoint analysis is commonly found in behavioral studies [Green & Srinivasan 1978] and in marketing studies [Green & Rao 1971] where the predictor variables are called attributes, and the dependent variable is often an overall evaluation of a product. A conjoint analysis study has two primary objectives. The first is to determine the contributions of various predictor variables and their respective values (or levels) to the dependant variable (usually overall evaluation). The second objective is to establish a predictive model for new combinations of values taken from the predictor variables [Bajaj 1998].

Table 2. Summary of Constructs – Determinants of E-Satisfaction

Category	Question	Feature	Attributes		
Technology	1	Security	Encryption	Accounts with IDs and passwords	Confirmation screen
	2	Privacy	Privacy statement	Policy on information selling	Use of cookies
	3	Usability	User-friendly interface	Adequate search capability	Interactive site
Shopping	4	Convenience	Ease and fun of shopping	Post purchase service	Price/product comparisons
	5	Trust	Faith in merchant and system	Reliability and integrity	Minimization of worries & regrets
	6	Delivery	Minimization of delivery time	Awareness of potential delays	Tracking number
Product	7	Merchandising	Extensive assortment	Exclusive and specialty products	Seasonal products
	8	Product Value	Customer gratification	Product quality	Overall cost
	9	Customization	Customizability	Online configurations	Number of options

The conjoint analysis methodology has several advantages. The first advantage is it focuses on the measurement of consumer preferences for attribute level variables. In our study the product is e-commerce. The second advantage is that conjoint analysis allows for a more realistic decision model for a population, because it forces subjects to evaluate the products as a whole (as in real life); it forms individual decision models for each subject and it allows the formation of an aggregate decision model across all the subjects, and permits the statistical testing of the null hypothesis that all the attributes have an equal utility in the aggregate decision model [Bajaj 1998]. The third advantage is the fact that the methodology makes no assumptions about the nature of the relationships between the attributes and the dependent variable. This makes it very useful when exploring unknown variables as potential predictor variables [Bajaj 1998]. Finally, other advantages of conjoint analysis include its ability to accommodate metric or non-metric dependent variables, its ability to use non-metric variables as predictors, and the flexible assumptions about the relationships of the independent variables with the dependent variable (ex. assumptions of linearity are not made) [Hair 1992]. Metric variables refer to an interval or ratio scale while non-metric variables refer to a nominal or ordinal scale.

Conjoint Analysis is related to experimentation in the traditional sense, in that the effects of levels of independent variables are determined on a dependent variable. In the case of e-commerce, where there is human behavior involved, it is necessary to also determine the effects of levels of certain variables (equivalent to independent variables) on the dependent variable, which in most cases (including this study) is an overall rating or a purchase decision or an adoption decision [Bajaj 1998].

The basic model in a conjoint analysis is: $Y = b_1 + b_2 + b_3 + …. + b_n + constant + \varepsilon$

where: Y = respondent's preference for the product concept (metric or non-metric)

b_i = beta weights (utilities) for the features (non-metric)

ε = an error term

In our study, respondents' ratings for the various customer values form the dependent variable. The measures of each customer value (the attribute levels) are the independent (predictor) variables. The estimated betas

associated with the independent variables are the utilities (preference scores) for the levels. There are six steps involved in a Conjoint Analysis study [Green & Srinivasan 1978], summarized in Table 2.

1. Selection of a model of preference: Green and Srinivasan [1978] considered three main preference models: vector model (linear), ideal point model (linear plus quadratic), and the part-worth function model (piecewise linear). The vector model estimates the fewest parameters by assuming the linear functional format. The part-worth model estimates the largest number of parameters because it allows for the most general functional form and the ideal point model is between these two extremes [Green & Srinivasan 1978]. In this particular study the part-worth function model was chosen because of the advantages listed prior. The part-worth function model is also the most commonly used in practice.

2. Data collection method: Data collection procedures in conjoint analysis studies have primarily involved variations on two basic methods: (1) the two-factor-at-a-time procedure and (2) the full profile approach [Green & Srinivasan 1978]. The two-factor-at-a-time approach considers factors (attributes) on a pair wise basis. The respondent ranks the various combinations of each pair of factor levels from the most to least preferred. In this study the full-profile approach was used. The full profile approach utilizes the complete set of factors for the subject to evaluate. It has been argued that the full-profile approach gives a more realistic description of stimuli by defining the levels of each of the factors and possibly taking into account the potential environmental correlations between factors in real stimuli [Green & Srinivasan 1978]. Another advantage of the full-profile method is the ability to measure overall preference judgments directly using behaviorally oriented constructs such as intention to buy [Green & Srinivasan 1978]. In this study, where the environmental correlation between factors is large and the number of factors on the stimulus cards is small (but greater than two), the full profile approach is likely to have more predictive validity.

3. Stimulus set construction for the full-profile method: The additive compensatory model assumed in conjoint analysis is likely to predict well even if the decision process is more complex [Green & Srinivasan 1978; Huber 1987]. In this study, respondents considered three specific features of each attribute that was to be analyzed and gave each feature a preference rating based on a ten-point scale ranging from "completely unacceptable" combination of customer values to the "perfect" combination of customer values.

4. Stimulus presentation: This study employed a paragraph description of the task as well as a written example of what needed to be done with the items that followed. The actual survey was set up in spreadsheet format with rows and columns substituting for profile cards. Sample instructions are provided in Appendix A.

5. Measurement scale for the dependent variable: There are two basic alternatives for defining a measurement scale for the dependent variable: metric (ratio scales, assuming approximately interval scale properties) or non-metric (paired comparisons, rank order). The measurement in this study uses the metric method. The main advantage of the metric method is the increased information content potentially present in the scales [Green & Srinivasan 1978].

6. Estimation methods: The parameter estimation method used in this study was ordinary least squares (OLS) regression. Johnston [1972] explains that the OLS procedure is the most appropriate when a study includes a dependent variable that is interval scaled. The OLS procedure also has the advantage of providing standard errors for the estimated parameters [Gogan 1996-97].

Table 3. Steps in Conjoint Analysis

Step	This study
1. Select a model of preference	Part-worth
2. Data collection method	Full profile
3. Stimulus set construction (full-profile method)	Additive compensatory model
4. Stimulus presentation	Written instructions
5. Measurement scale for the dependent variable	Metric
6. Estimation method	Ordinary Leased Square

In our study, numerous potential attributes for each factor were identified from previous literature and scored through a pilot study. The three strongest items from each attribute were selected for inclusion in the study (see Table 2). They were then pre-tested prior to final item selection. Modifications were made to reduce concerns of participants with wording and to clarify instructions.

Sample

The sample consisted of 188 undergraduate students (average age of 22 years old). Respondents included 60% males and 40% females. Almost all (99.5%) of the respondents had convenient access to a computer and to a credit card (92%), and 85% of the respondents had more than five years of computer experience. 89% of the respondents

had access to a broadband connection to the Internet. 99% of the respondents reported using the Internet in some capacity everyday and 57% stated gathering information about a product or service via the web at least several times a week. Over 90% reported shopping online several times a year and 22.3% reported that they hopped online at least several times a month. This sample is very appropriate for this study given the subjects' high level of Internet usage and online shopping experience.

Data Analysis

After the data were entered into Excel spreadsheets and cleaned for missing data, they were analyzed using SPSS 11.5. Conjoint utilities (part worths) are scaled to an arbitrary additive constant within each attribute. The arbitrary origin on the scaling within each attribute results from dummy coding in the design matrix. In this study, the part worth of one level within each attribute was arbitrarily set to zero to then estimate the remaining levels as contrasts with respect to zero. For example, for the security attribute of the technology factor we set encryption to zero. Confirmation screens and accounts/IDs/Passwords were then analyzed in comparison to encryption.

4. Results

Ranking of Technology Factors

The results of technology factor rankings are presented in Table 4 and Figure 2. Within the attribute of security, the use of a confirmation screen was found to be the most important "level" in determining whether the online consumer would be satisfied. However, the three preference ratings were very closely grouped (very small differences between part worths) indicating that perhaps online consumers today expect sites to provide security that offers a combination of these features.
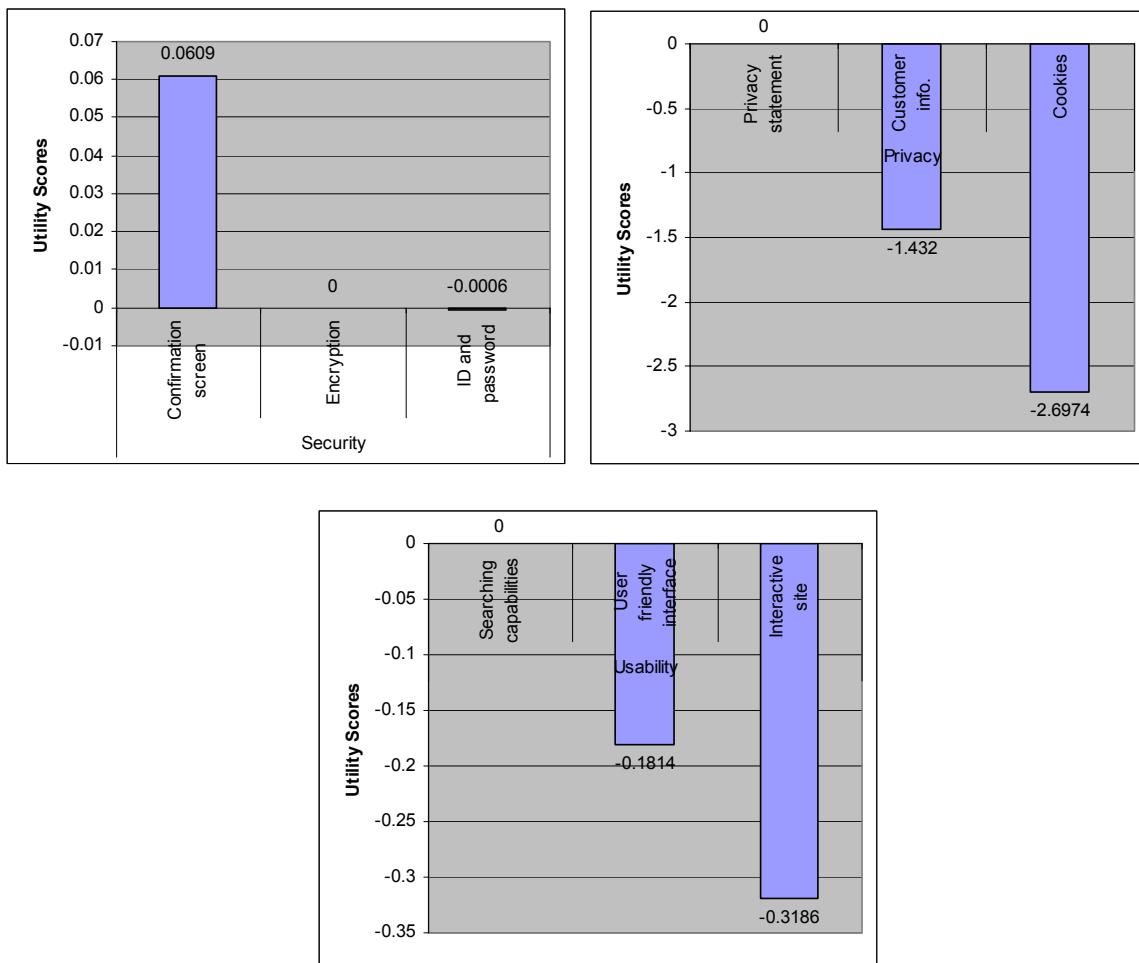

Figure 2. Average Technology Factor Utility Scores

Table 4. Results for Technology Factors

Factor	Attribute	Part Worth
Security	Confirmation screen	0.0609
	Encryption	0.0000
	Accounts w/ ID and passwords	-0.0006
Privacy	Use of a privacy statement	0.0000
	Selling of customer info.	-1.4320
	Cookies to collect personal info.	-2.6974
Usability	Searching capabilities	0.0000
	User friendly interface	-0.1814
	Interactive site	-0.3186

Within the privacy attribute, the use of a privacy statement was the most important feature. Searching capabilities were found to be the most important feature within the attribute of usability. User-friendly interfaces and having an interactive site were deemed less influential in the purchasing decision. A plausible explanation for this finding would be that online consumers want to be able to locate things of interest. User-friendly interfaces and offering an interactive site will add to the site, but if the customer cannot locate what they are looking for, it is hard to make a purchase. It could also simply be that friendly interfaces and interactive sites have become standard.

Shopping Factors

Within the attribute of convenience, overall ease of shopping was found to be the most important as compared to the ability to price compare and gather information as well as the post-purchase service that the e-commerce site provides (Table 5; Figure 3). The overall ease of shopping is undoubtedly a major advantage of e-commerce. Within the attribute of trust, the customer's faith in the merchant and the merchant's computer system was found to be of the most importance. In reality, an e-commerce site's ability to minimize customers' worries and regrets as well as their perceived reliability and integrity of the system is going to be dependent upon the customer's faith in the merchant and their computer system. If the consumer does not have faith in the merchant and their system it is highly unlikely that they will perceive the e-marketer to be reliable and of integrity. Without this positive perception
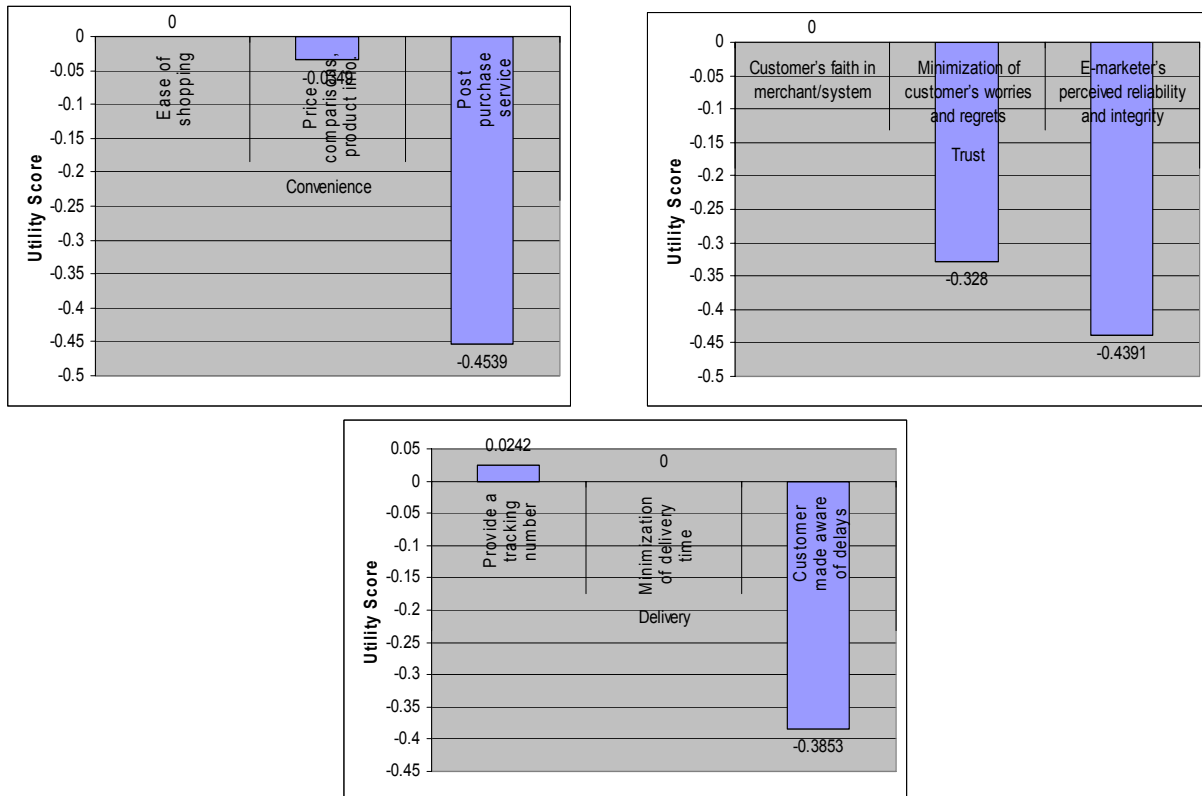

Figure 3. Average Shopping Factor Utility Scores

there is little chance of being able to minimize the worries and regrets of the consumer. Within the delivery attribute, providing a tracking number was found to be the most important. The ability of the e-commerce site to minimize overall delivery time was also of considerable importance. However, the customer being made aware of delays was found to be considerably less important than the other two levels. The results of this suggest that customer's don't want to wait for products purchased online. Consumers want to receive purchases as quickly as possible, as well as being able to track them while in transit. Tracking numbers may fulfill the consumers' need for instant gratification because they can estimate delivery time.

Table 5. Ranking of Shopping Factors

Factor	Attribute	Part Worth
Convenience	Ease of shopping	0.0000
	Price comparisons, product info.	-0.0349
	Post purchase service	-0.4539
Trust	Customer's faith in merchant/system	0.0000
	Minimization of customer's worries and regrets	-0.3280
	E-marketer's perceived reliability and integrity	-0.4391
Delivery	Provide a tracking number	0.0242
	Minimization of delivery time	0.0000
	Customer made aware of delays	-0.3853

Product Factors

Within the attribute of merchandising, product assortment and variety was found to be of the most importance to respondents as compared to the offering of seasonal products (Table 6; Figure 4). The offering of exclusive/specialty and seasonal products are important, but perhaps only in addition to an extensive product
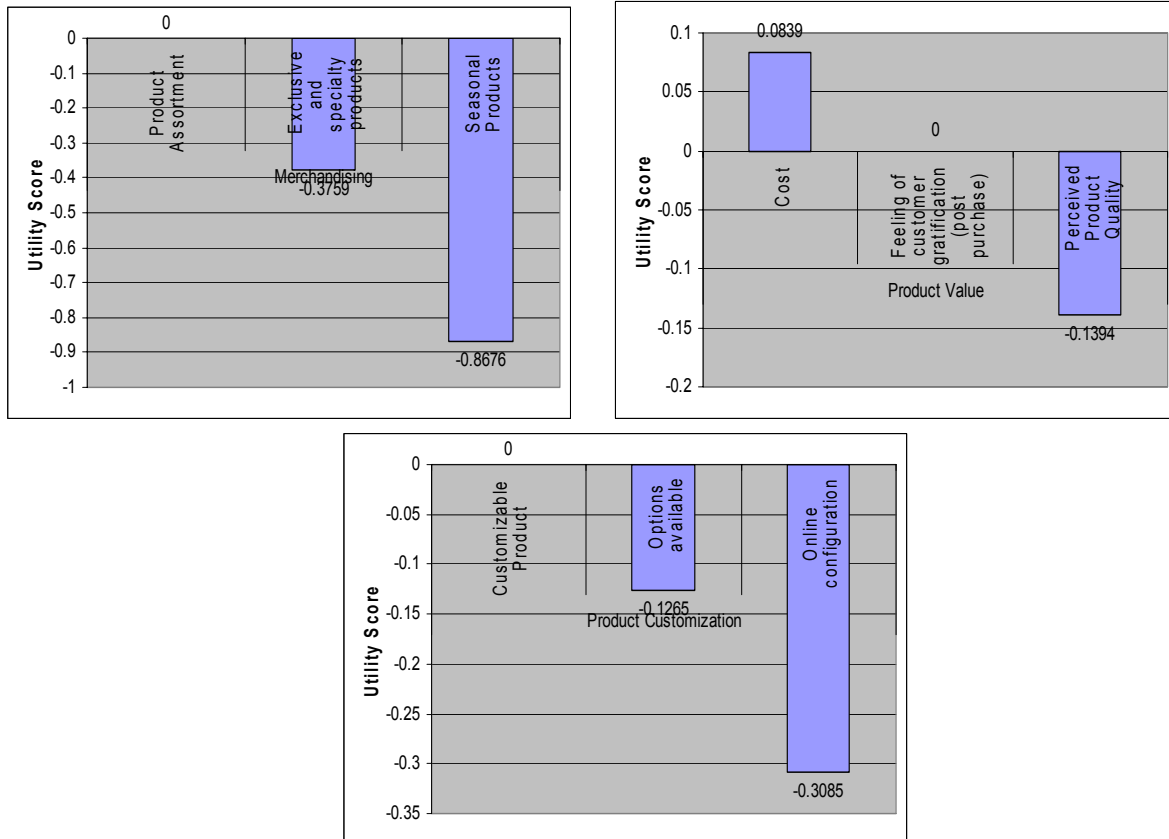

Figure 4. Average Product Factor Utility Scores

selection. If the e-marketer offered only exclusive hard to find products they may be missing out on the bulk of sales. An e-commerce store that has extensive product assortment as well as offering exclusive/specialty and seasonal products is probably the best scenario for consumers.

Table 6. Rankings of Product Factors

Factor	Attribute	Part Worth
Merchandising	Extensive product assortment and variety	0.0000
	Exclusive and specialty products	-0.3759
	Seasonal Products	-0.8676
Product Value	Cost of the Product	0.0839
	Feeling of gratification (post purchase)	0.0000
	Perceived Product Quality	-0.1394
Product Customization	Customizable Product	0.0000
	Options available for the product	-0.1265
	Online configuration capabilities	-0.3085

As expected, the overall cost of the product was found to be the most important within the attribute of product value. The customer's feeling of post purchase gratification was rated very closely to the overall cost of the product. The thinking here being that a customer's instant gratification could be a result of the price that they just paid. The perceived product quality being less important could be attributed to the fact that several outlets offer the same product. When quality of two items is similar at a number of e-stores; the determining factor is price.

Within the product customization category, the ability to customize the product was found to be the most important level. The amount of available options and the ability to configure the product online take a backseat to the overall importance of product customization being offered. Consumers want a customizable product; the number of options that are available and the capability of online configuration are of secondary importance.

Overall Importance and Ranking of Attributes

An overall importance score was calculated to determine what the most import attributes were, as presented in Table 7. This allows comparison of preferences across categories of factors.

Table 7. Relative Importance and Ranking of Attributes

Attribute	Factor Level	Relative Importance (equals 100% total)	Overall Rank
Privacy	Technology	46.9%	1
Merchandising	Product	15.1%	2
Convenience	Shopping	7.9%	3
Trust	Shopping	7.6%	4
Delivery	Shopping	6.7%	5
Usability	Technology	5.5%	6
Product Customization	Product	5.4%	7
Product Quality	Product	3.9%	8
Security	Technology	1.1%	9

5. Discussion

For single transaction e-commerce consumers to become repeat customers, they must be satisfied with there shopping experience (at a minimum). It is therefore important to understand factors influencing their satisfaction level. In the real world, consumer decisions include tradeoffs when deciding to purchase goods or services. Neither consumers nor Web merchants can maximize all factors involved. With the use of conjoint analysis, we were able to include the trade-offs in the decision process of consumers. The purpose of this study was to explore the factors found salient by consumers in their decision to purchase online. Our goal was to extend the existing e-satisfaction literature by building on previous literature resulting in the development of a more comprehensive conceptual model of e-satisfaction identifying key features with each attribute as well as determining the relative importance of each attribute with an overall ranking through the use of conjoint analysis. The study started by identifying nine attributes, as well as features within each, from previous literature that are antecedents of e-satisfaction, and was able to rank them according to preferences of consumers. We then provided an overall evaluation of the most

important factors to persuading the consumer to purchase at an acceptable level of satisfaction. Below we discuss some of the more interesting findings and their implications for both research and practice.

Perhaps one of the most interesting findings was how low the security attribute was perceived in regards to importance as compared to the others. An explanation of this result might be that the security features are perceived as being standard for all e-commerce sites, so they are indeed a determining factor in the purchasing decision, but when choosing an individual site to purchase from; other factors take precedence because an adequate level of security is assumed. This, actually, is consistent with prior work that suggest consumers think security is important but once faced with actual choices make decisions to purchase online based on convenience, and reputation of the Web merchant [Bélanger et al. 2002]. In addition, these findings are consistent with Suh and Han [2003] who suggested that despite the great strides made in e-commerce security technologies in the 1990's, lessening the possibility of security breaches, online customers still don't adequately understand security controls. Further, they can't know which controls are applied and implemented at a particular site. Thus, the actual strength of security controls doesn't fully explain customer acceptance of e-commerce [Suh and Han 2003]. Another potential explanation for this finding is also based on the age group of the respondents. Anecdotal data collected from students in e-commerce security classes suggest that young consumers are far less worried about security than older individuals. This should be researched further in future work.

Another interesting finding of this study is that privacy features are far and away the number one concern of online consumers in the purchasing decision. One explanation of this finding is that privacy features vary greatly from site to site and with the growing concern of credit card fraud, unwanted solicitation, and identity theft on the rise a customer's information being kept private is of great concern. This is consistent with earlier surveys of consumer privacy fears. A 1999 IBM Multi-National Consumer Privacy survey found that 80% of respondents felt that they had lost all control over how personal information is collected and used by companies [Branscum 2000]. A 2000 Pew Internet and American Life survey found that 66% of respondents felt that online tracking should be illegal and 81% reported that there should be legal limits on the amount of information that can be collected [Paul 2001]. In addition, a 2001 Harris Interactive e-commerce survey found that individuals who had not previously purchased online cited concerns over the collection and transmission of their personal information as the main reason why [Harris 2001]. The significance of privacy in this study is also consistent with the findings of prior literature [Bélanger et al. 2002; Branscum 2000; Hair et al. 1995; Ranganathan & Ganapathy 2002; Torkzadeh & Dhillon 2002]. The fact that privacy was viewed as the greatest issue when *other factors were concurrently evaluated* further reinforces the importance of this concept for online shoppers. Fortunately, researchers are increasingly developing studies to further our understanding of privacy in this context. Interestingly, it should also be noted that the sample for this research was North American. Since privacy laws are much more stringent in Europe, it may be that a study conducted with a European sample would result in a lower relative ranking for privacy in affecting consumer satisfaction.

The fact that usability was deemed to be of only moderate importance was a little surprising due to the fact that there is such a large base of research focusing on usability factors and there importance to the overall importance of e-commerce. Our study found usability to be in the bottom half of importance ranking. This finding is somewhat contradictory to findings in previous work. Szymanksi and Hise [2000] found that usability factors (called site design) such as searching capabilities and site organization were significant predictors of satisfaction. Agarwal and Venkatesh [2002] cite usability as the critical quality metric for websites, specifically e-commerce websites. However, the findings of this research could be due to the fact that our study consisted primarily of young experienced web users who are very familiar with the characteristics of online shopping. Future research should seek to evaluate if indeed usability would have greater importance with a more diversified sample.

Finally, but not least, it was interesting to see empirically that convenience and merchandising indeed strongly affect the satisfaction of online shoppers. Most previous studies of online commerce have focused on the Web site itself or the trustworthiness of the web merchants. This study measured the importance of those technology factors when placed in relation to product and shopping factors. A lot has been said about satisfaction from the online experience being related to the usability of the site, the reliability of the technology being used, or the trustworthiness of the merchant, but not surprisingly, in our study the product itself (merchandising) is at the top of the satisfaction list. This is actually consistent with previous findings which have highlighted the importance of product factors. Jarvenpaa and Todd [1997] found that factors such as product variety were significant in affecting consumers' perceptions of an e-commerce site. Torkzadeh and Dhillon [2002] found product factors to be significant means objectives, which are the methods to achieve desired ends. The findings of this study further highlight the fact that focusing only on technology may not be a good idea for online merchants.

This study presents the relative rankings of various factors as they affect consumer satisfaction. The research was conducted in a North American context and a given point in time. It should be noted that the concept of

electronic commerce is very dynamic, and that the relative importance of the factors identified may, over time, change somewhat. For example, as more privacy laws are enacted, privacy may become less of a concern. Similarly, as security improved over the years, it may have become less of an issue to consumers than it was originally. However, as new threats emerge, security may again become a key factor in affecting consumer satisfaction. It may also be that a currently lower ranked factor emerges as key, such as customization. Once individuals become used to providing information for customization and reaping the benefits of such one-on-one marketing, it may become the norm, or what is required of Web merchants to succeed.

Implications for Practitioners

This study addresses two questions of interest to practitioners: (1) What factors make on-line shopping most appealing to customers? (2) What customer values take priority over others? From the reported results, there are a couple of factors that take precedence in making on-line shopping appealing to customers. Undoubtedly the Internet gives the consumer the ability to access a much broader depth of products and services than the physical world. In the digital world if one web merchant does not offer the product that is desired it is very simple to jump to another merchant without much effort involved. In the physical world, this is much more difficult and time consuming, if one store does not have the product then it is necessary to physically leave the store and go to another in search of it. This comes at a considerable increase of time and effort on the consumer's part. Thus, a prevalent factor in e-commerce satisfaction and appeal is the notion of convenience. Convenience is one of the primary selling points of e-commerce. Online shopping needs to be easy to take part in and must give the consumer the feeling having fun in the process to replicate the scenario of shopping in the physical world. In addition, since merchandising is so important, offering a broad variety of products is often key for Web merchants to keeping customers coming back (assuming satisfied customers do come back).

Regarding the overall ranking of values, the results suggest that the privacy and protection of a consumer's personal information is by far the most important value. The use of a privacy statement by Web merchants was found to be the most important feature within the privacy attribute. Often, however, privacy statements are hard to find, hard to read, or hard to understand. A simple effort that Web merchants can make to improve the satisfaction of their online customers is to make the privacy statement easily accessible (as some site do) instead of hiding it in a sub-menu. It should also be easy to read. This involves making clear statements regarding data collection, use, and protection. The consumer wants to be able to control who has access to their personal information. It is imperative that consumers have a feeling of control over their personal information. Merchants can offer "opt-in" alternatives to create this feeling of control. They can also provide customers with easy to find contact information for answering privacy related questions.

The results suggest a number of avenues for future research areas for improving our understanding of the potential success and failure of retailing on the Internet. First, further research is needed to show preferences among higher-ranking attributes. For example, greater comparisons among technology, product, and shopping categories would provide useful information for Web merchants. In addition, since the influence of these factors may change as the Internet marketing channel evolves, and as more consumers gain experience, studies that look at the importance of the factors in relation to shopping behavior over time is required. Another potential avenue of research would be to replicate this study with subjects that are less Internet savvy, and from different age groups.

Limitations

As in all social science research, this study is not without limitations. The present findings are mainly exploratory in nature and it would be inappropriate to generalize too far from a single study. One issue is the use of student subjects who may not be representative of the online shopping community. While students do shop online, a broader subject base may be more appropriate. Another limitation is the use of a paper based full-profile method conjoint analysis. An adaptive conjoint analysis that could be administered via the Web could provide more utility, enabling us to add more levels to each attribute initially, and then select the highest scoring levels for the final analysis.

Future Research

This study provides a model of key factors affecting online consumer satisfaction. The research can be extended in many ways. First, using a paper based survey we could not include too many categories and too many levels for each attribute. Future work could be done using an adaptive conjoint analysis administered via the Web with more levels to each attribute. We could then select the highest scoring levels for the final analysis based on the data. We could also include more categories of factors and more attributes. It would also be interesting to explore categories of factors not typically found in the literature, such as social influence factors. It would also be interesting to do a time series study to investigate if/how consumer preferences change over time.

6. Conclusion

In the volatile world of e-commerce, it is particularly important to understand the consumer and the values that lead to their satisfaction. Successful e-commerce sites need to exhibit more qualities than just good site design and security. While browsing a site online consumers encounter a multitude of factors simultaneously that influence their purchasing decision. This study introduced the conjoint analysis methodology to the domain of business-to-consumer e-commerce. As a result, the study provided a more realistic view of the consumer's online decision-making process by having the respondent make an overall evaluation of several measures of online shopping attributes all at once as opposed to piece by piece as done in prior literature. Thus, the tradeoffs consumers make among attributes, during the decision making process, is determined. Privacy factors were found to be far and away the most important factor affecting the consumer's satisfaction, while security was deemed least important by our subjects. Consistent with prior e-satisfaction literature merchandising and convenience were also deemed important, following only privacy. Surprisingly, usability was ranked in the bottom half which is inconsistent with prior literature. In sum, the current research introduces a very useful methodology to the e-commerce domain and helps practitioners understand the tradeoffs consumers make during the purchase decision.

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Appendix A

Use the scale below to rate the following combinations of online customer values, indicating how important each combination is for your satisfaction with on-line shopping. For example, rate sets of customer values that you feel to be the perfect combination for achieving your overall customer satisfaction as a 10 and any combination of customer values that you feel to be completely unacceptable as a 1.

Scale:
  10=Perfect combination of customer values   9=Not the ideal combination of values, but still very good
  8=Good combination of values   7=Moderately good combination of values
  6=Above average combination of values   5=Neutral
  4=Below average combination of values   3=Moderately bad combination of values
  2=Unacceptable combination of values   1=Completely unacceptable combination of values

Ex. My preferences when renting an apartment are dependent on three features: pets allowed, washer and dryer, and a dishwasher.   #1: Pets allowed, washer and dryer, dishwasher = 10
                                    #2: Pets allowed, no washer and dryer, dishwasher = 7
                                    #3: Pets not allowed, washer and dryer, dishwasher = 1
As you can see the first apartment that I looked at would be my ideal combination because it has all of the features that I require. The second apartment is acceptable, but not the best. The last apartment does not allow pets, so I definitely don't want it. The most important factor to me is the ability to have a pet.