

**TURNING VISITORS INTO CUSTOMERS: A USABILITY-CENTRIC
PERSPECTIVE ON PURCHASE BEHAVIOR IN ELECTRONIC CHANNELS**

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July, 2003
Revised, June 2004
Revised, March 2005

ABSTRACT

The primary objective of this paper is to develop a theoretical model for predicting purchase behavior in electronic channels. We employ web site use (i.e., technology use behavior), a key indicator of the degree to which a site is “sticky” in that it attracts users often and retains them for longer periods of time, as a predictor of purchase behavior. Further, we relate usability, a construct that has been the focus of HCI and IS research, to use behavior and purchase behavior. Specifically, individual characteristics and product type are expected to differentially influence the weights that customers place on the five categories of usability studied here. The weighted ratings of the five categories together determine use behavior and purchase behavior, after controlling for purchase need, experience with similar sites, and previous purchase on the specific sites. The proposed model was tested in a longitudinal field study where 757 customers provided usability assessments for multiple web sites from four different industry sectors—i.e., airlines, online bookstores, automobile manufacturers, and car rental agencies. Six months later, 370 of these individuals provided responses to help understand the transition from “visitor” to “customer,” i.e., actually transacted with a specific web site. Results provided strong support for the model. Theoretical and practical implications of the findings are offered.

INTRODUCTION

Most e-commerce sites rebuff at least 70% of the customers who visit them, passing up millions of dollars in potential sales. Even the best retail Web sites are doing only half the business they could be doing, researchers say. The culprit: poor Web site usability. (Lais, 2002)

It is widely accepted today that electronic channels have the potential to become an important alternative avenue for firms to reach their customers and to generate sales (Moe and Fader, 2004). Indeed, the value proposition of electronic commerce is that it can aid firms in transcending physical barriers to customer reach and increase the size of the potential customer base. However, this reach is predicated on the assumption that customers will be willing to use the firm’s electronic channels—specifically, its web site—to engage in commerce. Although there is a significant body of work related to individual behavior in the context of new technologies (see Venkatesh et al., 2003 for a review), web sites constructed for customers pose at least two new challenges for firms. First, the users of electronic channels are typically outside the immediate sphere of managerial influence, thereby limiting the use of interventions to promote adoption and use. Second, because web sites exhibit significant variety in capabilities and functionality, specifying the requirements for such systems is a complex task. Recent

statistics indicate that although there are a growing number of individuals using the Internet to perform product research, price comparisons, and the like, actual purchases made online are still relatively small (Moe and Fader, 2004). Thus, a significant concern for organizations is to understand the barriers and facilitators of online purchasing and to construct web sites that are capable of turning “visitors” into paying “customers.”

Prior research examining online purchase behavior has approached the problem from several diverse perspectives. Drawing from technology acceptance theories, some researchers have focused on using individual beliefs such as usefulness and ease of use for predicting the extent to which customers will buy online (Chen, Gillenson, and Sherell, 2002). Others have posited and empirically confirmed that consumer attitudes towards online shopping and intentions to shop online are influenced by product perceptions, the attributes of the shopping experience, customer service, and consumer risk (Jarvenpaa and Todd, 1996-1997). Additionally, the effects of various demographic characteristics such as income, educational level, Internet use, and Internet search, and perceptions of web vendor’s sales processes on retail purchasing behavior have been studied (Burroughs and Sabherwal, 2002). In an attempt to better understand online consumer behavior, scholars have developed segmentation models of Internet shoppers (e.g., Burke, 2002; Moe, 2003). Finally, some researchers have examined the relationship between specific design elements of a virtual store and important outcomes such as sales volume (e.g., Lohse and Spiller, 1999).

To further our understanding of web site use and online purchase behavior, we use an alternative theoretical lens—i.e., usability—for the prediction of purchase behavior in the context of B2C electronic commerce. As defined by ISO, usability is defined as the “extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (Karat, 1997). The importance of usability in the

study of online behaviors has been noted in human-computer interaction (HCI) and information systems (IS) research. For instance, extensive research in HCI has argued that the use of a web site is influenced by its usability (e.g., Nielsen, 2000). Both HCI and IS researchers argue that usability is a key metric for assessing a range of different systems, including web sites (e.g., Agarwal and Venkatesh, 2002; Palmer, 2002, Nielsen, 2000). Because usability is associated with multiple important outcomes such as error reduction, positive attitudes, and increased use (Lecerof and Paterno, 1998; Nielsen, 2000), we expect it to be an important determinant of online purchase behavior. Our conceptualization of usability provides a rich and comprehensive view that complements and extends prior work in HCI and IS.

Although the importance of web site usability has been acknowledged, there has been limited research examining the effects of usability on *purchase* behavior. Arguably consumer purchase behavior is of significance not only to marketing researchers and practitioners but also to organizations seeking to understand the impact of their web presence on commerce. We pose the questions: what influences consumer perceptions of web site usability, and does the usability of a web site have an effect on subsequent purchases from that web site? To answer these questions we develop a nomological net for usability encompassing both its determinants and consequences. To identify determinants of usability, we draw upon research in consumer behavior that has investigated online shopping environments. In predicting purchase behavior, in addition to usability, based on IS research, we employ web site use (i.e., technology use behavior) as a key predictor. Use behavior has been a central dependent variable in much IS research, particularly in the domain of user adoption, and is one of the key system success constructs (see Delone and McLean, 1992; Seddon, 1997). In the context of web sites, use behavior represents the degree to which a site is “sticky” in that it attracts users often and retains them for longer periods of time (Rosen, 2001).

We tested the proposed model via secondary analysis of data reported in Agarwal and Venkatesh (2002) where 757 users provide usability assessment for multiple web sites. The prior data and new data gathered from a subset of users (N=370) six months later about their use and purchase behavior on these sites yields a longitudinal panel for model testing.

THEORY

The overall nomological net for the theorized determinants and consequences of web site usability is shown in Figure 1. We present the theoretical background for usability that builds on research in human-computer interaction and IS. Next, we draw upon theories in IS, psychology, consumer information processing, and consumer behavior to develop specific hypotheses related to the determinants and consequences of web site usability.

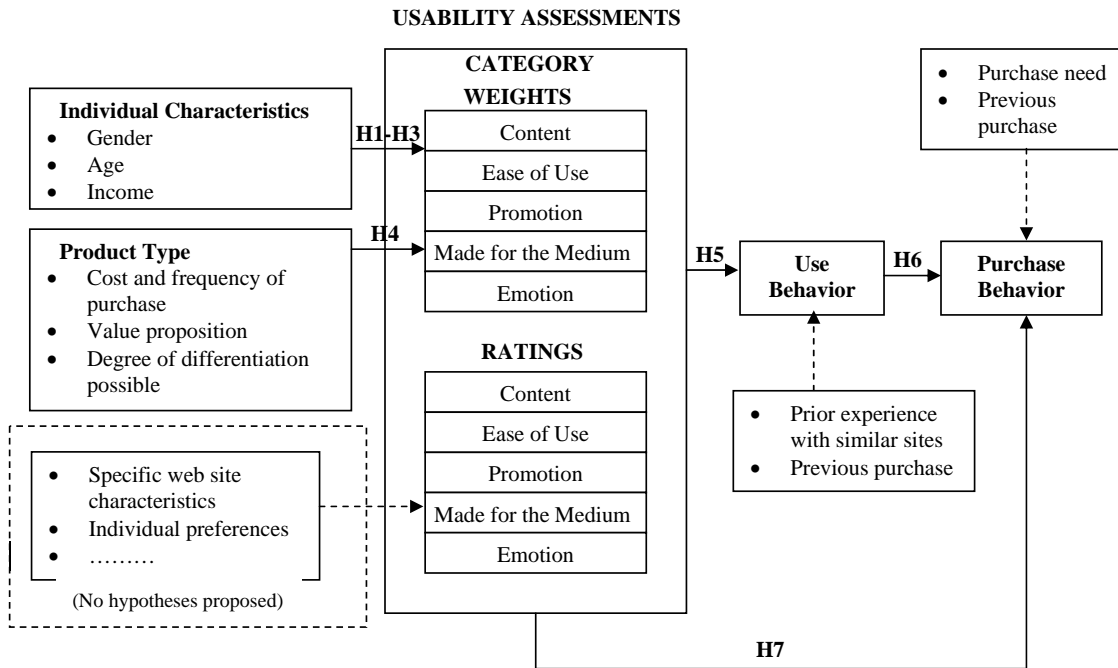


Figure 1. Theoretical Model

Background: Usability and Its Categories

The notion of usability plays a pivotal role in decades of HCI research, where a focal tenet is that in order for technological devices to be successful, their design must pay attention to the complexities associated with the human-computer interface (e.g., Shneiderman, 1980). As observed recently by Olson and Olson (2003), “HCI is the study of how people interact with computing technology.” (p. 492). The goal of HCI research then is to understand how to design and engineer more *usable* artifacts. Guidelines, techniques, and methods emerging from HCI research have been used to inform the design of personal digital assistants (Milewski and Smith, 2000), to investigate errors made while utilizing alternative modeling approaches (Agarwal, De, and Sinha, 1999), and to examine usability of virtual environments (Barfield and Furness, 1997).

In the context of web sites, usability has gained considerable prominence based on the influential work of Nielsen (2000). Nielsen asserts that usability engineering is key to commercial web site design and argues that an organization that does not pay attention to this aspect is not likely to generate traffic to its web site or, even if visitors stop by, the site will lack the crucial attribute of “stickiness.” Researchers also acknowledge that usability cannot be conceptualized independent of the context in which it is to be assessed: Lecerof and Paterno (1998) argue that what constitutes usability is contingent upon both the task for which the system is to be used as well as the target users. For example, fun might be a primary criterion for systems designed for use by children, while efficiency is likely to be a major usability goal in the design of banking systems.

Prior research has proposed multiple factors along which the usability of web sites may be assessed. Eighmey and McCord (1998) derived seventeen factors tapping into different aspects of web site usability that were subsequently reduced to nine groups including dimensions such as personal involvement, useful information, simplicity of organization, and desire for

relationship. Likewise, Nielsen (2000) offers a wide range of design principles for a usable system, derived from a synthesis of extensive prior work conducted by he and his colleagues. As highlighted in the ISO definition of usability, it is important to note that usability is inherently a subjective phenomenon, and its nature and assessment is highly dependent on the user's goals.

The specific aspects of usability examined here are those incorporated in the usability metric and instrument described in Agarwal and Venkatesh (2002). The instrument operationalizes Microsoft's Usability Guidelines (MUG), which is one of the most comprehensive collection of usability criteria available, and includes a broad range of attributes that are likely to be relevant to consumer evaluations of web sites (Agarwal and Venkatesh 2002). The guidelines include five major categories that collectively tap into different aspects of the usability of web sites: *content*, *ease of use*, *promotion*, *made-for-the-medium*, and *emotion*. Four of the five categories (i.e., except promotion) are further decomposed into sub-categories that specify finer-grained usability attributes. The categories and sub-categories that comprise the usability metric are consistent with the ISO definition of usability. Particularly, the dimensions of *effectiveness*, *efficiency*, and *satisfaction* emphasized in the ISO definition relate to MUG categories in the following way: (a) content and made-for-the-medium tie to effectiveness goals; (b) ease of use and made-for-the-medium tie to efficiency goals; and (c) promotion and emotion tie to satisfaction. Additionally, the MUG categories have been shown to possess content validity (see Agarwal and Venkatesh, 2002 for a development of the metric).

It is also noteworthy that some MUG categories overlap with factors that have been shown to shape individual behaviors towards information technologies in prior IS literature. Particularly, "content" is similar to perceived usefulness, or the instrumental outcomes associated with technology use in a variety of technology adoption models; similarly, ease of use, tapping into the cognitive effort required to use an artifact, recurs as an important driver of

technology use intentions in several models of adoption (Agarwal and Prasad, 1998; Davis et al., 1989; Taylor and Todd, 1995; Venkatesh et al., 2003). Likewise, “emotion” reflects affective reactions to web sites—such reactions have been shown to be important to a variety of technology use behaviors (Agarwal and Karahanna, 2000; Venkatesh 2000).

While demonstrating some commonality with previous IS research, particularly on technology acceptance, the MUG categories considerably extend the range of attributes along which web sites can be evaluated. For instance, content is subdivided into relevance, media use, breadth and depth, and current and timely information. Thus, unlike perceived usefulness that assesses the degree to which using an information system improves an individual’s performance, content offers a more detailed and granular assessment. Additionally, MUG includes categories, made-for-the-medium and promotion, that are not featured in extant theoretical models of technology acceptance (Venkatesh et al., 2003) but are nonetheless critical to the evaluation of web sites. Therefore, the MUG categories provide a robust and detailed basis for assessing the usability of a web site. Empirically, Agarwal and Venkatesh (2002) demonstrated that usability assessments as measured by MUG correlate very highly with overall usability assessments of web sites, thereby providing support for the validity of the MUG metric and instrument.

The measurement of usability using this instrument is a three-step process. First, users assign weights to each category and subcategory to reflect their assessments of its importance in determining the usability of a web site that offers a specific product. Second, they provide a subjective rating of the usability of the web site for that category or subcategory. Finally, the weights and ratings provided by each individual are multiplied together and aggregated across all the subcategories in a particular category, yielding an overall usability score for the category. More details about the metric and the associated measurement procedure are available in Agarwal and Venkatesh (2002).

Hypothesis Development

We noted earlier that usability is context dependent and will be influenced by a variety of factors. Indeed, in reviewing the development of theory in HCI over the past three decades, Olson and Olson (2003) observe that HCI researchers are increasingly interested in modeling context-specific, as opposed to generic, behaviors with technological artifacts. Such context dependence has been alluded to in the domain of consumer behavior as well where researchers acknowledge that evaluative criteria differ in type, number, and importance (Hawkins, Best, and Coney, 1995), and much like consumer behavior in general, criteria are dependent on the consumer, the product, and the situation (Belk, Wallendorf, and Sherry, 1989). For example, simple products tend to be evaluated using a limited set of factors, while an expensive product is likely to entail the assessment of many more evaluative criteria prior to a positive purchase decision. In addition to the criteria themselves being influenced by the consumer, the product, and the situation, there is evidence to suggest that the relative importance assigned to each criterion differs systematically across multiple consumption situations characterized by different configurations of products and consumers. Thus, marketers are concerned with not only identifying the specific evaluative criteria that consumers are likely to use, but also the relative importance (weights) each individual consumer assigns to these criteria. Such information is also critical for IS designers, since it helps isolate specific features that different types of individuals in different situations would desire in a technological artifact. Given this background, we examine the drivers of the importance (weights) of usability categories next.

Individual and Product Characteristics

A substantial body of prior research in IS and marketing theorizes about the relationships between individual characteristics and demographic variables as predictors and technology-related behaviors (Venkatesh et al., 2003) and consumer behaviors as outcomes (Morton et al.,

2001; Vakratsas, 1998). Consumer behavior research also suggests that the nature of the product plays an important role in consumer information processing and search, in both online and offline environments (Chiang and Dholakia, 2003). Particularly, demographic variables have been utilized extensively to not only explain and predict consumer behavior, but also to segment consumers more effectively with regard to their purchase propensities, such that more homogeneous behaviors are expected within groups and more heterogeneous across (Dawar, Ratneshwar, and Sawyer, 1992). The three demographic variables that are consistently related to consumer behavior are gender, age, and income; gender and age have also been shown to influence technology perceptions and use (Gefen and Straub, 1997; Venkatesh and Morris, 2000; Venkatesh et al., 2003). On the basis of research in IS and consumer behavior in general and consumer information processing in particular (Burke, 2002), we argue that individual characteristics and product characteristics will influence what consumers deem to be important in the design of a web site, i.e., the *weights* they assign to different usability categories. However, because affective reactions to specific aspects of usability, i.e., *ratings*, are likely to be driven by factors such as the specific design choices made for a particular web site, and preferences such as whether individuals prefer tabular or graphical displays, there is no *ex ante* expectation that individual or product characteristics examined here will be causally related to ratings. As shown in Figure 1, although we acknowledge the existence of these other factors, they are outside the scope of the current research.

Gender

Among the traditional demographic variables, gender plays a crucial role in consumption evaluation, with women and men exhibiting different behaviors towards a multitude of product types (Barletta, 2003; Dawar et al., 1992). Examples of these different behaviors are available in research that shows that women interpret advertising messages differently from men (Prakash,

1992), men have distinct preferences regarding durable goods such as automobiles (Triplet, 1994), and men constitute a significant group of consumers of leisure and sports products (Zinn, 1991). Gender plays a role in the evaluation of service encounters—women tend to focus on the relational aspects of the encounter, while men pay greater attention to the substantive aspects of the service and outcomes achieved (Barletta, 2003). Gender differences arising from differential relational needs persist in the context of behaviors on the Internet as well; as observed by Smith and Whitlark (2001), men have stronger preferences for information, while women tend to prefer community-building activities and are more responsive to emotional appeal. Smith and Whitlark further point out that the functional needs of men and women for web sites are likely to vary.

With regard to computing technology in general and web-based shopping in particular, gender has been shown to be an important predictor of attitudes (Burke, 2002; Van Slyke, Communale, and Belanger, 2002). Specifically, there is evidence to suggest that men would place greater weight on usefulness perceptions, whereas women would place greater weight on ease of use perceptions (Venkatesh and Morris, 2000). As noted earlier, there is similarity between those two constructs and content and ease of use categories respectively and therefore, this will likely be evidenced by a greater weight being assigned by *men to content* and greater weight being assigned by *women to ease of use*. Further, women's greater emphasis on relational aspects is supported by evidence that women are more influenced by social norms when making decisions about technology adoption (Venkatesh and Morris 2000). This combined with women's preference for emotional appeal is likely to be exhibited in web contexts via a greater emphasis on *promotion* and *emotion by women*. Since gender differences in made-for-the-medium can be argued both from the perspective of enhancing effectiveness (content) and efficiency (ease of use), we expect the weights to be comparable across women and men. Specifically, the community component is likely to be more important to women because

of their interest in relationship-building. However, the personalization component can help enhance access to content (effectiveness) and help do so with less effort (efficiency), thus being appealing to both women and men. The potential for refinement and addition of content will likely be more important to men because of the ties to usefulness. Therefore, we hypothesize:

H1: Gender will influence the weights individuals assign to the usability categories such that: (a) content will be more important to men; (b) ease of use, promotion, and emotion will be more important to women; (c) made for the medium will be equally important to women and men.

Age

Similar to gender, age has a significant influence on consumer evaluation of products, with older consumers displaying preferences that are different (Moschis, 1991) from those of younger consumers (Fay, 1993). In behaviors on the Internet in particular, age has been found to be strongly related to adoption and use (Feller, 2003). There are different theoretical pathways through which the effects of age on the importance of usability categories can be explained. To the extent that *younger* consumers are more socialized with technology, they are likely to place *less importance on ease of use*, which is confirmed in recent IS research (see Venkatesh et al., 2003). Likewise, we expect *older* consumers to be typically more thoughtful and deliberate in their evaluation processes and therefore, assign *higher weight to content* (Burke, 2002). As the most avid consumers of web sites, younger visitors are likely to value the ability to connect electronically with others and, arising from their need to express unique self-identities (Bao and Shao, 2002), they will tend to have a stronger preference for sites that treat them in a personalized fashion. Both community and personalization are aspects of *made-for-the-medium* category, thus making this category more important to *younger* consumers. However, we find no plausible mechanism whereby there would be difference between older and younger consumers with regard to the importance of promotion or emotion. Therefore, we hypothesize:

H2: Age will influence the weights individuals assign to the usability categories such that a) content and ease of use will be more important to older consumers; b) made-for-the-medium will be more important to younger consumers; c) promotion and emotion will be equally important to younger and older consumers.

Income

Among demographic variables that influence consumer information processing and search behaviors, income plays a significant role. Household income affects consumption choices by virtue of the purchasing power and status it confers, and has been shown to have an impact on consumption in several product categories (Simmons Market Research Bureau, 1991). To the extent that income affects consumption choices and expectations, we expect it to also influence the importance consumers assign to the various categories of web site usability. Higher income individuals have higher opportunity costs for their time and desire to complete transactions as quickly and efficiently as possible (Pashigian, Peltzman, and Sun, 2003). Indeed, time-convenience aspects have been shown to be significantly related to consumer decisions to shop online (Chiang and Dholakia, 2003) and therefore, *higher income* consumers would likely value *content* and *ease of use* substantially. Similarly, to the degree that customization offers greater efficiency in search (Diehl et al., 2003), reduces cognitive costs, and delivers valuable content (Haubl and Trifts, 2000), the ability of a web site to offer a personalized experience will be more important to higher-income consumers. This importance of personalization will be reflected in the higher importance of *made-for-the-medium* to *higher income* consumers. Higher income consumers seek to reassure themselves about product quality and because advertising is typically viewed as a signal of product quality (Lynch and Ariely, 2000; Milgrom and Roberts, 1986), they will exhibit a stronger preference for the usability category of promotion. However, there is no theoretical or empirical evidence supporting a relationship between income and the category of emotion. Therefore, we hypothesize:

H3: Income will influence the weights individuals assign to the usability categories such that (a) content, ease of use, promotion, and made for the medium will be more important to high-income consumers; (b) emotion will be equally important to low- and high-income consumers.

Product Type

Finally, as shown in Figure 1, we theorize that the nature of the product has an effect on what consumers seek from a web site that offers the product. Recently Peterson, Balasubramaniam, and Bronnenberg (1997) noted that it is important to incorporate product and service characteristics into discussions of the use of the Internet for marketing. They argue that the traditional dichotomy of products and services as search versus experience goods needs to be revisited in light of the capabilities of the Internet. Whereas search goods are characterized by product attributes that are fully known prior to purchase, experience goods are those where either information search is costly, or product attributes cannot be reliably determined prior to purchase and trial. Peterson et al. (1997) propose an alternative classification that is posited to be more relevant for Internet marketing where goods are distinguished along three dimensions: (1) cost and frequency of purchase; (2) value proposition, i.e., whether the good is tangible and physical or intangible and service related; and (3) degree of differentiation possible with the good. They further suggest that consumer decision processes and search behaviors are likely to vary in accordance with specific constellations of these three dimensions. Thus, it is reasonable to suggest that user evaluations of web sites are likely to be influenced by the type of product the web site is designed to support.

Additional support for the influence of product type on consumer search behavior in an online setting is provided by Hahn and Kauffman (2002). Using information foraging theory as the conceptual framework, they classify products into three categories: convenience goods, researched goods, and replenishment goods. Each product category is differentiated on the basis

of the consumer behavior dimensions of need arousal, information search, product evaluation, purchase decision, and post-purchase evaluation. They then argue that because consumer behavior is different across the product types, the specific capabilities and features of the web site required to support such behaviors are likely to vary across product categories.

Building upon the theoretical arguments presented in prior work, we suggest that the importance of usability categories will be systematically related to product types. There are a variety of ways in which product type can influence the relative importance of usability categories for consumers and, given the multiple classifications of product types extant in the literature as well as the multiple dimensions along which products can be differentiated, our objective is not to develop specific hypotheses relating different product types to usability categories. Rather, we seek to examine the *nature* of the influence of products on different usability categories.

What are the usability categories that are likely to be assigned different weights across different product types? Because shopping is an inherently information-intensive activity that involves search, evaluation, and selection, the importance of content will be uniformly high across all product categories (e.g., Bettman, 1970). By contrast, the importance of other usability categories will be different, depending on the type of product. For instance, expensive products that are less frequently purchased such as automobiles, i.e., what Hahn and Kauffman label as “researched goods”, promotion is likely to be an important criterion, as better perception of promotion signals quality (Milgrom and Roberts, 1986). Likewise, when evaluating intangible goods with differentiation potential such as car rentals and airlines, consumers will value the emotional aspects of the web site, and the made-for-the-medium dimension that includes personalization will be important. Ease of use is likely to be more important for researched

goods, since consumers expend considerable effort in the information search activity here.

Therefore, we hypothesize:

H4: Product type will have (a) a significant influence on the weights individuals assign to the usability categories of ease of use, promotion, made for the medium, and emotion, and (b) a non-significant influence on the weights individuals assign to the usability category of content.

Outcomes of Usability

As suggested in the HCI literature, technological artifacts that are more usable are likely to engender greater use. The causal mechanism underlying this relationship is that of motivation: usable systems not only meet the instrumental goals of users, they also alleviate the cognitive effort associated with use (Nielsen, 2000). Further, artifacts that support hedonic goals such as enjoyment lead to greater use (Agarwal and Karahanna, 2000). In the context of web sites, such use can manifest itself in many different ways: users may simply visit a web site for a brief period of time and move on to another destination in cyberspace, they may spend time browsing a web site and exploring its capabilities, or they may visit the web site to make a purchase. Regardless of the consumer's goals, we suggest that usability will have a positive effect on use. These theorized effects of usability on use are not only supported by research in HCI, they are also consistent with findings in the IS literature. Particularly, the content and ease of use categories that are conceptually similar to perceptions of usefulness and ease of use in user acceptance models have consistently explained significant variance in individual technology use behaviors in a variety of contexts (Venkatesh et al., 2003).

In order to isolate the effects of usability on use behavior, it is important to control for other significant factors that may influence use. Prior technology use, often referred to as habit, has been shown to influence future use in IS contexts (Venkatesh, Morris, and Ackerman, 2000) and the role of habit as a determinant of behaviors is well-established in psychology (e.g.,

Ouellette and Wood, 1998). Habit or routinization is also acknowledged as important in both traditional shopping (Alba and Hutchinson, 1987) and online shopping environments (Reibstein, 2002). We include prior experience with similar web sites and previous product purchases from the web site as additional predictors of use behavior. Prior experience, a reflection of a consumer's familiarity with the product, has been shown to strongly influence subsequent behavior (Celci and Olson, 1988; Hoch and Deighton, 1989). Generally referred to as "learning," the key notion here is that with greater experience, consumers can perform product-related tasks more effectively, and have a richer store of prior knowledge to draw upon. Experienced consumers' knowledge structures are more differentiated and hierarchically organized (Hoch and Deighton, 1992), and prior product-class knowledge has been shown to influence both information search behavior (Brucks, 1985) and evaluation processes (Sujan, 1985). This distinction between "experts" and "novices" is echoed in the HCI literature, where researchers have argued and empirically demonstrated that the level of experience and knowledge possessed by a user is an important driver of artifact use (Card, Moran, and Newell, 1983). Greater experience with similar sites allows users to develop search and navigational strategies that are more efficient, and should, therefore, have a positive effect on use. Likewise, if a consumer has purchased a product previously from the web site, there is a greater likelihood of using the web site again, simply because of the level of comfort and familiarity the repeat use provides (Moe and Fader, 2004). Therefore, we hypothesize:

H5: Individuals' assessment of the content, ease of use, promotion, made for the medium, and emotion categories of usability for a web site will predict their use of the web site, after controlling for prior experience with similar sites and previous product purchase from the web site.

As depicted in Figure 1, we suggest that use behavior is a determinant of purchase behavior. The amount of time spent in a physical retail outlet such as a mall has been shown to

influence the volume of purchases made at a store (e.g., Jarboe and McDaniel, 1987). This relationship is not restricted to physical stores alone. It has been argued that the greater the length of time users spends on a web site, the more likely they are to purchase the products offered on the web site (Rosen, 2001). Indeed, it is these anticipated benefits of web site stickiness that have prompted managers to pay close attention to mechanisms that can help retain customers at a web site. As before, it is important to control for other significant factors that influence consumers' purchase behavior. In predicting purchase behavior, we include two important control variables: (a) purchase need, assessing the intensity with which the consumer enters the shopping environment with a goal-directed need; and (b) previous product purchase. Purchase behavior is more likely to result when there is a stronger need for the product (Moe, 2003), while previous product purchases account for any loyalty the consumer may have developed for the specific store (Huang and Hu, 1999). Therefore, we hypothesize:

H6: Individuals' use of a web site will predict purchase behavior on the web site, after controlling for purchase need and previous product purchase from the web site.

Finally, we posit that the goal-oriented and utilitarian categories of usability, i.e., content and made-for-the-medium will exhibit a direct effect on purchase behavior. Whereas the mediated effect via use behavior is likely to be observed for impulse purchases when visitors are merely browsing a web site—e.g., in the case of “experiential” shopping (Wolfenbarger and Gilly, 2001), when there is a consumption need that is well-specified, a customer may not desire to “linger” on the site, but rather, execute a purchase in a timely manner. Wolfenbarger and Gilly (2001) label this type of customer as goal-oriented or utilitarian, where accessibility, convenience, and information availability are dominant factors in the consumer's decision process. Thus, the richer the content and personalization offered on the site, the greater the likelihood of a purchase in goal-directed consumer situations. Therefore, we hypothesize:

H7: Individuals' assessment of the content and made-for-the-medium categories of web site usability will predict purchase behavior on the web site, after controlling for web site use, purchase need, and previous product purchase from the web site.

METHOD

Participants

The population of interest in this study was Internet users. Data were collected in two phases. As reported in Agarwal and Venkatesh (2002), the sampling frame for Phase 1 data collection was visitors to three branches of a major retail store during a three-day period (Friday, Saturday, and Sunday). The specific participants were identified using a "mall-intercept," which is discussed in greater detail in the "Procedure" sub-section. A total of 920 individuals agreed to participate in the study and 757 provided usable responses, for an effective response rate of 82.3%. Six months later, in Phase 2, we tried to reach all 757 participants, and successfully contacted 384 participants over a 2-week period. Of the 384 contacted, 370 of those provided usable responses for an effective response rate of 48.9% from Phase 1 to Phase 2. Demographic information of the participants in both phases broken down by the various industries is shown in Table 1. A comparison confirms comparable demographics across both phases.

Table 1. Demographic Characteristics

	Auto manufacturer		Car rental		Airline		Bookstore	
	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2
N	201	105	149	69	230	120	177	76
M/F	130/71	70/35	95/54	41/28	151/79	81/39	111/66	50/26
Age	31.07 (6.84)	30.77 (6.91)	30.98 (6.80)	32.10 (7.01)	30.07 (6.62)	31.03 (6.89)	30.01 (6.64)	31.34 (6.71)
Income	57,987 (7,922)	56,217 (7,158)	56,545 (7,887)	55,420 (7,712)	57,004 (8,275)	54,132 (7,988)	58,145 (8,045)	56,130 (8,132)

Note: Mean and standard deviation (in parentheses) pairs are indicated for age and income.

Procedure and Measurement

The procedure for Phase 1 is described in detail in Agarwal and Venkatesh (2002) and summarized briefly below. Participants were recruited at three branch locations of a major

electronics retail store. Three kiosks were set up in the participating stores for the participants to browse the specific web sites being studied and also respond to the questionnaire. The use of three kiosks at each store helped minimize participant wait time. As noted earlier, web sites were chosen from four industries with 5 or 6 companies being chosen in each industry—auto manufacturers (BMW, Chrysler, Ford, GM, Mercedes, and Porsche), car rental (Alamo, Avis, Budget, Hertz, and National), airlines (American, Delta, Northwest, United, and US), and bookstores (Amazon, Barnes and Noble, Booksense, Borders, and Varsity Books).¹

As discussed earlier in the theory section, related to product type, four types of products are examined here: (a) *automobiles*, representing high outlay, infrequently purchased, tangible value proposition, and high differentiation potential in the Peterson et al. (1997) classification, (b) *car rentals* and *airline reservations* representing moderate outlay, purchased somewhat frequently, intangible value proposition, and moderate differentiation potential, and (c) *books*, representing low outlay, frequently purchased, tangible value proposition, and low differentiation potential. The selection of web sites was purposively made to include web sites that are likely to differ in their specific characteristics (i.e., their design features), thereby ensuring variance in ratings. For instance, in bookstores, we included leaders such as barnesandnoble.com and no-frills online stores such as booksense.com. Similarly, car rentals included companies targeting varying types of customers such as Budget, Alamo, and Hertz. Only in the case of airlines did we specifically not include an airline such as Southwest. The rationale for doing so was because we wanted to ensure that most customers would have had an opportunity to deal with one or more of the airlines, and Southwest was not a major carrier in the geographic region where this study was conducted at the time of the study.

¹ In order to protect the anonymity of these sites and the organizations they represent, sites are listed here alphabetically and do not represent the order in which they were entered in the data file.

When a participant arrived at a kiosk, he or she was prompted with a request to fill out a survey as a customer of web sites in one of the four industries, with the specific industry being randomly selected by the computer.² The respondent provided his or her perception of the relative importance (weights) of the different MUG categories subcategories by distributing 100 points across the 5 major categories and then further allocating the points among the different subcategories. The usability category *weights* thus governed all the web sites that a participant was evaluating. Following this, the participants visited the web sites, with the order of presentation of the different web sites being randomized by the computer. Every participant was given 5 minutes to browse each web site—the system prompted them if they wished to continue to browse the web site after that point and allowed for continued browsing. After browsing each web site, the participants rated the site on the different MUG categories and subcategories on a 10-point scale. The product of the weights and ratings together provided an individual's weighted rating for each usability category. Next, information regarding the participant's prior experience with the Internet, prior experience with web sites in that specific industry, prior experience with the specific web sites, purchase need related to the product type, previous purchase on the web sites, and demographic information were collected.³

Phase 2 was a telephone interview of participants from Phase 1. The interviews were conducted by individuals in the telemarketing department at the sponsor firm. They possessed about 6 months of experience in telephone-based services. The objective of Phase 2 was to

² The data were gathered from 1,475 individuals in Phase 1, performing either the customer or investor task (see Agarwal and Venkatesh 2002). However, for the purpose of this paper, only the data related to the customer are being used.

³ We collected data on individuals' experience with the Internet, prior experience with the specific web sites, and computer self-efficacy as additional controls because of findings from prior research that these variables are related to technology use (e.g., Venkatesh et al., 2003). Preliminary analysis indicated that they were not significantly related to the outcomes examined here and hence, these variables were not included in the test of the research model. The non-significance of these variables is likely due to their effects being captured by other constructs in the model. For example, self-efficacy is reflected in ease of use perceptions, while Internet experience is likely more distal from use behavior than prior experience with similar sites.

collect behavioral data for the six months subsequent to Phase 1. Up to thirty callbacks were attempted to reach the participants in Phase 2. The average phone call lasted less than 4 minutes. During the phone interview, participants were asked about their use of the various web sites that they had rated in Phase 1 and their purchases from the web sites. The items, other than those measuring usability which are reported in Agarwal and Venkatesh (2002), are shown in the appendix. Web site use was measured using 4 formative indicators—frequency of use (1st item), duration of use (2nd and 3rd items), and intensity of use (4th item) over the past 6 months. Purchase behavior was measured using two formative indicators: frequency and amount of purchase in the past 6 months.

RESULTS

We analyzed the data using the structural equation modeling technique of partial least squares (PLS). The software used for the analysis was PLS Graph, Version 2.91.03.04. PLS is effective to test a causal model such as the one proposed in Figure 1, particularly because of its ability to model constructs using formative indicators. Further, PLS does not make distributional assumptions unlike LISREL, and is therefore suitable for situations where the data might violate normality assumptions (Chin, 1998).

PLS estimates a measurement model for each structural model tested. The measurement model provides information about the reliability and validity of various scales, particularly multi-item scales using reflective indicators. In the models tested here, some constructs were operationalized using single items (e.g., gender, age, income) and others were modeled using formative indicators (e.g., use behavior, purchase behavior), thus reliability and validity statistics were not applicable in all cases. In cases where reliability and validity were applicable (e.g., purchase need), high reliability and validity were found based on internal consistency reliability (ICR) and average variance extracted (AVE). For analytical purposes, product characteristics

were captured via three dummy variables—Product1, Product2, and Product3—that were coded as a 0/0/0 for the airlines, 1/0/0 for the bookstores, 0/1/0 for auto manufacturers, and 0/0/1 for the car rental industry. Further, in order to test the model, the interaction terms were created at the level of the indicator per the guidelines of Chin, Marcolin, and Newsted (1996).⁴

Descriptive statistics and correlations for the Phase 2 data are shown in Table 2.

Purchase was most highly correlated with use. Use, in turn, was correlated with the different weighted ratings—highest with content, ease of use, and made-for-the-medium. For the other constructs in the model, gender and age are correlated with many of the variables, with the correlations with the product dummy variables being about .20 or greater. The pattern of correlations between gender, age, and the various weights are in the direction predicted by the hypotheses.

We tested two different models using the Phase 2 (N=370) data.⁵ The first model examined the specific effects of demographic characteristics and product characteristics on the weights placed on each category. In the second model, using category-level weighted ratings and control variables as predictors, we examined use behavior as the dependent variable. Also in this model, utilizing use behavior, category-level weighted ratings, purchase need, and previous purchase as predictors, we examined purchase behavior as the dependent variable. Time spent browsing each site was used as a control variable but was found to be non-significant in all cases and, therefore, dropped and the models were re-estimated. The other control variables related to experience did not have an effect on both behaviors and were also dropped and the models re-estimated, which is standard practice in model estimation to eliminate shared variance between

⁴ If A X B is being modeled and A1, A2, and A3 are the indicators of the construct A, and B1 and B2 are the indicators of the construct B, the latent variable A X B is created with the following indicator-level product terms: A1 X B1, A1 X B2, A2 X B1, A2 X B2, A3 X B1, and A3 X B2.

⁵ We also tested the left-hand side of the model—i.e., the effects of individual characteristics and product type—on the sample from Phase 1 (N=757). The pattern of results from the two different sets of tests was identical.

significant and non-significant constructs, thus permitting a more accurate understanding of the predictive ability of the significant constructs.

The models for weights were reasonably well-supported, with R^2 ranging from 21% to 43%. Table 3 presents the results. Gender influenced the weights of 4 of the 5 categories, with content and made-for-the-medium being more important to men, and ease of use and emotion being more important to women, but the weight on promotion did not differentiate on the basis of gender. This provides partial support for H1. While the hypothesis related to greater importance of promotion to women was not supported, in addition, made-for-the-medium being more important to men was contrary to expectations that there would be no difference by gender. Perhaps, made-for-the-medium was driven more by the content and task-oriented objectives than the efficiency objectives, thus making it more important to men when compared to women.

Age influenced the weights placed on content, ease of use, and made-for-the-medium, with all 3 categories being more important to older people; no effects were observed on promotion or emotion. H2 was thus mostly supported. The only contrary finding was that made-for-the-medium was more important to older consumers and not to younger consumers. As was the case of gender, the possible reason for this is the emphasis on the content, task, and effectiveness aspects of made-for-the-medium, which are more important to older consumers, rather than any of the other aspects such as e-community or uniqueness that would be more important to younger consumers.

Income influenced the weights placed on content, promotion, and made-for-the-medium, with all 3 categories being more important to higher income consumers; ease of use and emotion were not differentiated on the basis of income. Thus, H3 was mostly supported. The only contrary finding here was that ease of use was not differentiated by income, in contrast to our expectation that it would be more important to higher income consumers because they would be

time-starved. Often higher levels of income are associated with higher levels of education, possibly resulting in higher levels of technology competence, which is generally accompanied by a reduced importance of ease of use (see Venkatesh et al., 2003). Thus, such high levels of technology competence may have counteracted any effects due to time starvation.

Using the three categorical variables to operationalize product type, we found that the weights placed on different usability categories did, in fact, discriminate on the basis of product type. Specifically, with the exception of content, the weights placed on the other 4 categories were influenced by the product dummy variables, thus supporting H4(a) and H4(b).

Table 3. Predicting Category Weights

	DV: Content	DV: Ease of use	DV: Promotion	DV: Made-for-the-medium	DV: Emotion
R ²	.35	.34	.21	.43	.30
Gender (1: Men)	.26***	-.25***	.06	.16**	-.18***
Age	.17**	.16**	.08	.16**	.06
Income	.13*	.03	.10*	.18***	.04
Product1 (1: Bookstore)	.03	.13*	.02	.15**	.02
Product2 (1: Auto manuf.)	.08	.04	.15**	.03	.13*
Product3 (1: Car rental)	.02	.12*	.04	.16**	.06

Notes:

1. N=370
2. Dependent variables are weights assigned to each usability category,
3. Beta coefficients are shown.
4. *** p<.001; ** p<.01; *p<.05.

Use was predicted by a combination of weighted ratings of MUG categories, demographic characteristics, and previous product purchase. Table 4 presents the results. Once again, most of the factors suggested in H5 did indeed predict use. Content, made-for-the-medium, and ease of use were the most important (in order of importance) predictors of use in terms of beta weights. Previous product purchase was the next most important predictor, while gender (greater use among men) and age (greater use among younger people) were also significant, while income was not significant. Also, emotion had a small but significant effect on use, despite its low weights (see Agarwal and Venkatesh, 2002), while promotion, another low-

weighted category, did not have any effect. Perhaps, prior experience with the sites was not significant since it likely shared variance with previous product purchase on the web site. Thus, overall, the MUG categories demonstrated a high degree of predictive validity on use behavior measured over a 6-month period, with an explained variance above 60%.

Similar to use, purchase behavior was predicted by a combination of factors. The proposed partially-mediated relationships presented in H6-H7 were supported (see Table 4). Use had the strongest effect on purchase, while weighted ratings of content and made-for-the-medium had a direct effect on purchase beyond what was mediated by use. This is consistent with our theory that quality content, including tailored content, can, in fact, result in purchase without the need for high levels of site use. As expected, both control variables, purchase need and previous purchase had a significant effect on purchase behavior.⁶ Collectively, the proposed predictors accounted for over 60% of the variance in purchase behavior, thus providing a good explanation of the key dependent variable.

Table 4. Predicting Use and Purchase

	DV: Use	DV: Purchase
R ²	.63	.63
Use		.30***
Usability Scores (Weight*Rating)		
Content	.32***	.22***
Ease of use	.21**	.02
Promotion	.08	.07
Made-for-the-medium	.29***	.21***
Emotion	.13*	.08
Prior experience with similar sites	.07	
Purchase need		.13*
Previous product purchase on web site	.19**	.20**

Notes:

1. N=370
2. Shaded cells are not applicable in the context of a specific model.
3. Beta coefficients are shown.
4. *** p<.001; ** p<.01; *p<.05.

⁶ Although not shown, we also tested a model that included two interaction terms—use and purchase need and use and previous purchase—and found both interaction terms to be non-significant.

DISCUSSION

Summary of Findings and Limitations

The goal of this paper was to offer a usability-centric perspective on purchase behavior in electronic channels by developing a nomological net for web site usability. Drawing on IS and HCI research, we argued that the usability of the technological artifact would influence both the extent to which the web site is able to attract and retain visitors, as well as the transformation of these visitors into actual consumers. Based on HCI research that suggests that usability is a subjective construct, we used *perceived* usability as a central construct in our theoretical model. In contrast to the work of others such as Lohse and Spiller (1999) in which researchers themselves assessed the usability of stores, we gathered usability assessments from customers.

We further described a range of individual and product factors that are influential determinants of the importance consumers place on various usability categories. Empirical results provide support for a majority of the proposed relationships and the critical role of perceived usability in our model. Additionally, the longitudinal nature of the study supports the theorized existence of the causal relationship between usability and use behavior, and usability and purchase behavior. The inclusion of relevant control variables such as prior experience with similar sites, previous purchase behavior on the web sites, and purchase need in examining use and purchase behaviors allowed us to isolate the effects of usability on these key outcomes. Finally, the large sample size and the fact that we examined multiple web sites from diverse industry sectors enhance the external validity of our results.

Prior to discussing the implications of our findings however, it is important to acknowledge the limitations of this research. We used self-report measures of actual purchase behavior rather than objective data related to sales. Nonetheless, because of the fact that respondents in Phase 2 of the study had no incentive to misrepresent their frequency and volume

of purchases, we do not view this limitation as a major threat to the results. The data for use behavior and purchase behavior were gathered at the same point in time, therefore although causality is theoretically implied, it cannot be directly inferred from the research design. Some non-significant findings should be interpreted with caution until replicated because of the potential for type II error. For instance, demand factors of the experimental setting may have suppressed the importance that participants assign to emotion. Similarly, the importance of promotion may have been reduced because subjects did not have an opportunity to enter the specific web site from another site where it was being “promoted.”

Additionally, as noted in Agarwal and Venkatesh (2002), although the mall-intercept technique is an accepted research design for studying consumer populations (e.g., Cowan, 1989), the sampling method can pose a potential threat in regard to selection bias. However, the fact that data were collected over three days in three different locations mitigates this concern somewhat. Based on our sampling technique, the generalizability of the findings is limited to consumer populations that typically shop in malls and to the types of products we studied. Finally, we were unable to establish contact with all of the respondents from Phase 1 to obtain follow-up data in Phase 2. Nonetheless, we were able to obtain a sample size of over 350 for testing the full research model.

Implications for Research

IS researchers have long sought to characterize the *success* of an information system using a variety of outcomes ranging from information satisfaction, to user satisfaction, to actual use (DeLone and McLean, 1992). Yet, much of the research on technology acceptance and use stops at the prediction of use behavior, where the link between use and performance outcomes is implied but not tested (e.g., Venkatesh and Davis, 2000). Indeed, there has been limited research that integrates system success measures with outcomes of organizational interest such as

purchases. An exception worth noting here is the recent work of Devaraj and Kohli (2003), where, using longitudinal data from hospitals, different measures of technology use were related to outcomes such as hospital revenue and quality. Devaraj and Kohli (2003) speculated that actual technology use is the missing link between technology investments and IT payoffs. In a similar spirit, our study suggests that in the context of B2C electronic commerce, use behavior and usability exhibit important downstream effects on sales. Future research is necessary to study the relationship between actual use of web sites and other firm-level outcomes.

We described a nomological net for usability that can serve as the foundation for much future work. Drawing upon research in marketing, we proposed two sets of drivers of the importance of usability categories. Future research can build upon literature from other disciplines such as psychology to extend the nomological net and incorporate additional determinants of usability such as relatively stable personality characteristics (Digman, 1990) or more transient “state” variables such as mood (Hill and Ward, 1989). We did not include the specific task the consumer is engaged in as a driver of the weights assigned to usability categories. A logical extension to this work would, therefore, be to extend the model to incorporate task types such as the distinction made by Wolfinbarger and Gilly (2001) between “experiential” and “goal-directed” shopping, or by Moe (2003) between directed buying, search/deliberation, hedonic browsing, and knowledge building. In particular, our focus here has been on business-oriented sites, while more entertainment-oriented sites could cause customers to greatly vary their weighting scheme because of the nature of the interactions. For instance, it could be argued because entertainment sites typically serve hedonic goals, among the usability categories, emotion will dominate in importance for users (see Agarwal and Karahanna, 2000).

Likewise, although we examined “products” from four different industry sectors, there are many flavors of business to consumer sites that support different types of transactions. Thus,

for example, this work could be replicated for sites that are purely content-oriented or that offer online service capabilities to determine if the findings generalize. Such work would lead to more comprehensive view of the role of usability and also, help us identify potential contingencies tied to particular types of web sites. Further, our use of categorical variables for product type and the finding related to their significant effects suggests the need to refine our theoretical understanding of these relationships by proposing more specific relationships between different types of products and the importance of usability categories. For such theoretical development, products could be differentiated on the basis of a number of taxonomies. In our study, we selected product categories based on our assessment of the specific characteristics identified by Peterson et al. (1997), such as frequency of purchase, differentiation potential, and outlay. As discussed, Hahn and Kauffman (2002) provided a different product taxonomy that could be used to further deepen our understanding of the role of the product in driving usability. In future research, it would also be useful to directly measure these specific product characteristics using objective or perceptual data. Although we identified the drivers of category weights, our theorizing did not include predictions about the drivers of ratings. As indicated in Figure 1, useful opportunities exist to extend the nomological net for ratings by including variables such as specific web site design features and individual preferences.

Overall, our work complements and extends current thinking in HCI, IS, and consumer behavior research on the role of perceived usability as a critical predictor of use behavior and purchase behavior. In our conceptualization of the determinants of purchase behavior, we presented a complementary view to the traditional belief-attitude-behavior models that have been dominant in IS research (e.g., Taylor and Todd, 1995; Venkatesh and Davis, 2000). An interesting extension to this study would be to examine the relative explanatory power of a usability-based model versus a social psychology perspective to determine which one represents

a better conceptualization of purchase behavior. Additional research is necessary to integrate these perspectives into a more holistic model. Given the maturity of technology adoption research, this “new” usability-centric view may yield novel theoretical and empirical insights that will provide a basis for furthering our understanding of technology use. Future research could also extend the proposed model to include other determinants of purchase behavior such as perceptions of the sales process and Internet search described earlier to isolate the additional variance explained by usability and use behavior.

While the nomological network presented here is important and provides an integrated view of a firm’s web presence and its impact, the model is primarily a predictive one, given the focus on constructs that are relatively stable. Future research should expand this model to include more malleable constructs which may be the targeted for design, training, and other managerial interventions. Additionally, our investigation and conceptualization of usability has treated it as a subjective construct, consistent with a large body of work in IS and HCI. However, alternative conceptualizations that view usability as a more objective construct using say a keystroke model (e.g., Card et al., 1983; Jeffries et al., 1991) should also be considered, particularly for a comparison to the results from the current work. Overall, the relationships tested here represent an important initial step towards a model that serves as critical input for web site design in a wide variety of person-situation configurations.

Finally, while one of the strengths of the current work is the use of a longitudinal data set from consumers, such field settings come with some obvious limitations related to potential confounding factors. An important future research direction that stems from this is the need to conduct experimental studies. In addition to enhancing internal validity, such studies can be used as a test bed to examine the effectiveness of various design interventions that are informed

by the results of the current work. In particular, experimental research would be useful in determining the drivers of ratings and their relative impacts on user evaluations.

Implications for Practice

Our findings have important implications for firms that desire to establish a successful web presence. Assuming that one measure of online success is the volume of purchases made at a web site, our results indicate that the usability of the site explains significant variance in purchase behavior via a direct path, after controlling for other important drivers of purchase behavior. Clearly then, the first managerial recommendation that emerges is the importance of paying close attention to the usability of a web site that is to be used by customers for transaction purposes. The fact that usability also influences purchase behavior via a path mediated by use further underscores its significance. Usable web sites cause visitors to remain on the site for extended periods of time, thereby increasing the likelihood of an ultimate purchase. As demonstrated in the findings of Rozanski, Bollman, and Lipman (2001), “loiterers” and “surfers” have among the lengthiest online sessions during a typical interaction on the web, and also reported the highest levels of purchasing behavior. Our findings reinforce the importance of usability testing for organizations, with one mechanism for performing such testing being collaborations between researchers and practitioners.

At a more granular level, important managerial insights are embedded in the specific relationships that we found between individual and product factors and the weights assigned to usability categories. For instance, our results show that men value content and personalization on a web site, while women value ease of use and emotion. Practitioners can use these findings to design web sites that specifically match the requirements of different consumer populations based on individual characteristics. Our results also show that what users believe to be important aspects of usability is influenced by the nature of the product the web site is offering. Not

surprisingly, content is uniformly viewed as important across all product types, underscoring other work that has characterized the Internet as a channel that significantly enhances information availability (e.g., Bakos, 1997). Additionally, product type influenced the weights assigned to other usability categories—for instance, ease of use is perceived by consumers to be more important for bookstores and online car rentals, as compared with airlines; and there is no significant difference in the importance of ease of use between auto manufacturers and airlines. Although specific recommendations are possible only with additional studies using different samples, these findings nevertheless have important implications for resource allocation in web site design. Depending on the nature of the product that is being sold on the web site, managers should seek to invest the most in those aspects of the site that consumers rate as being important.

CONCLUSIONS

As indicated by recent data comparing overall retail sales to sales via electronic channels (Census Bureau, 2003), it is evident that B2C electronic commerce represents a huge market opportunity for firms seeking to expand their touch points with customers. Successfully developing and executing a web presence that yields actual sales requires an understanding of both marketing and IS. This research, situated at the nexus of IS, HCI, and marketing, represents one effort in that direction. The fact that web site usability is an important prerequisite for firms desiring to establish a successful web presence has been recognized in much research. In this work, we empirically demonstrated that a rich and detailed conceptualization of usability could have an important effect on sales and thus, a firm's bottom line. The basic framework presented here—i.e., including individual characteristics, product type, use behavior, and purchase behavior—provides the basis for further inquiry to include experimental studies, moderating influences, and the addition of other variables. As organizations continue to expand their web

presence, the drivers of usability identified here can assist managers in formulating appropriate site design strategies.

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APPENDIX. MEASUREMENT ITEMS

Gender: Female, Male

Age: 18-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55 or older

Annual Individual Income (Before Taxes): Less than \$20,000, \$20,000 - \$29,999, \$30,000 - \$39,999, \$40,000 - \$49,999, \$50,000 or more

(Education level, which was also measured, correlated .91 with income)

Prior Experience with Similar Sites:

1. How many years of experience do you have with web sites in ... industry?
Less than 6 months, 6 months or more but less than 1 year, 1 year or more but less than 2 years, 2 years or more but less than 5 years, 5 years or more
 2. How would you describe the extensiveness of your experience with web sites in ... industry?
None at all, Limited, Moderate, Somewhat extensive, Extremely extensive
- Similar questions were asked to ascertain computer experience, Internet experience, and experience with a specific web site.

Purchase Need (7-point Likert scale):

1. I have a high need to buy ... (product type—e.g., books).
 2. The purchase of ... is important to me.
 3. Often, I think about buying ...
- Note: These questions were worded differently depending on the industry—e.g., books vs. car rental.*

Use Behavior:

1. Over the past six months, how frequently did you visit...? (Very infrequently... to very frequently; 7-point scale)
2. On average, on each visit, how much time did you spend at...? __ hours and __ minutes
3. In an average week, how much time did you spend at...? __ hours and __ minutes
4. Considering your visits to ... over the past six months, would you consider yourself to be a... (Very light to Very heavy; 7-point scale) user of the site?

Purchase Behavior (Collected in Phase 1 for use as a control measure; Collected in Phase 2 for use as a dependent variable):

1. On average, in the past 6 months, how frequently did you shop on....?
Once a day, 3-5 times a week, Once a week, 3-5 times a month, Once a month, Less than once a month, Never shopped on the Web
2. On average, how much did you spend during each “shopping visit” to....?
< \$25, \$25-50, \$50-74, \$75-100, \$100-199, \$200-499, \$500-999, >\$1,000

Usability:

Detailed weights and ratings for various categories of usability were measured as discussed in the text of the paper and reported in Agarwal and Venkatesh (2002).