

Online Services, Customer Characteristics and Usability Requirements

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Abstract

Designing web sites that are responsive to customer needs is a critical prerequisite for the success of online services. Recently, a usability evaluation procedure, based on the Microsoft Usability Guidelines (MUG) has emerged. MUG identifies five design requirements – content, ease of use, made-for-the-medium, emotion, and promotion – that should increase the usability of sites. To date, however, there has been limited research examining why online customers would place more or less importance on these requirements. In addition to demographic characteristics which may help explain customer needs, we propose that psychographic characteristics will also influence usability-related requirements. To develop our research model and hypotheses, we draw from recent usability literature and research in consumer behavior concerned with customers' beliefs about technology, specifically focusing on four beliefs – optimism, innovativeness, discomfort, and insecurity. We present the results of our study, involving 215 subjects, which examined the influence of customer characteristics on usability requirements.

1. Introduction

In a recent survey of online customers, nearly 50% report spending their time on entertainment, news and information (e.g., games, weather, maps, etc.); 12% of their time online researching products (e.g., comparing pricing and making purchases); and 27% of their online time on communications (e.g., posting reviews, blogs, etc.).¹ The success of online services is largely determined by the customer experience via the web site interface. The interface provides a mechanism for customers to search for/access content, conduct transactions, and to communicate [9, 45]. The customer

experience via the interface must satisfy both sensory and functional needs [1, 35, 45, 50, 54, 58].

Usability has been shown to be a key driver of site use [34, 39, 50, 56]. Usability is the ease with which an online customer can employ a web site to achieve a specific goal. A variety of design suggestions to improve web site usability can be found in both the academic literature and trade press (e.g., [3, 12, 29, 30, 32, 40, 45]). Recently, a usability evaluation procedure, based on the Microsoft Usability Guidelines (MUG; see [30]), has emerged [1, 56, 58]. MUG identifies five design requirements – *content, ease of use, made-for-the-medium, emotion, and promotion* – that should increase the usability and appeal of sites. To date, however, there has been limited research examining why online customers would place more or less importance on these requirements [1]. Additional research is needed to better understand the relationship between customer characteristics and usability requirements such that the needs of diverse customers can be met via the interface [5, 53].

While demographic characteristics can help explain customer behavior as related to usability requirements (e.g., [23, 56, 59]), we propose that customers' psychographic characteristics – specifically, beliefs about technology – may also influence usability requirements. In contrast to demographics, psychographics seek to describe customers on psychological dimensions [60]. The basic premise is that the more that is known and understood about the *beliefs* of current (or potential) customers, the more effectively products and services can be developed to meet their needs [5, 6, 21, 44].

We draw upon research in consumer behavior that has investigated consumers' beliefs about technology (c.f., [10, 11, 14, 36, 46, 47]). We focus specifically on research related to *Technology Readiness (TR)*, i.e., the propensity to embrace and use new technologies for accomplishing goals [47]. TR reflects four beliefs – *optimism, innovativeness, discomfort, and insecurity* – that may influence customers' usability requirements. Arguably, a deeper understanding of both demographic and psychographic antecedents to usability

¹ <http://www.internetretailer.com/dailyNews.asp?id=21637>

requirements should facilitate web site design and ultimately the success of online services.

In the following sections, we describe usability requirements and discuss customer characteristics. In addition to demographic characteristics, we introduce and describe four psychographic beliefs related to a customers' propensity to embrace and use technology-based products and services. Following the development of our research model and hypotheses, we present and discuss the results of our study. We conclude our paper with a discussion of limitations and future directions.

2. Usability and customer characteristics

While a variety of usability definitions exist (c.f., [22, 33]), we adopt the ISO 9241 definition: "the extent to which a product [online service] can be used by specific users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use" ([28], p. 34). The usability and design of web sites has received attention in the human computer interface (HCI) literature as well as in web-specific usability research (c.f., [45] for a review). In general, while guidelines exist for improving web site usability (c.f., [39, 40]), they do not prescribe which specific aspects of usability are more important or whether importance varies by different online customers.

Recent research has introduced and deployed a usability evaluation procedure [1, 58, 59], based on the Microsoft Usability Guidelines (MUG; see [30]). MUG identifies five web site design requirements: *content*, *ease of use*, *made-for-the-medium*, *emotion*, and *promotion*. Briefly, *content* refers to the extent to which a web site offers informational and transactional capability (e.g., relevance and timeliness). *Ease of use* refers to the extent to which a web site is "free of effort" (e.g., easy navigation). *Made-for-the-medium* refers to the extent to which a web site can be tailored to fit specific needs of users (e.g., personalization). *Emotion* refers to the extent to which a web site evokes emotional reactions (e.g., ability to control the pace of information). Finally, *promotion* refers to the extent to which a site is well promoted on the Internet or through other media (e.g., TV, magazines). When MUG is operationalized, individuals assign weights to each of the requirements by distributing 100 points. This activity is independent of any specific web site; rather, it indicates which requirements are more (or less) important to a particular user.

Prior research in IS and marketing theorizes about the effects of various demographic variables (e.g., age, gender, income) on technology-related behaviors [57] and customer choice [38]. Recent research suggests

that usability requirements may, in fact, differ based on demographic characteristics (i.e., age, gender) [56, 59]. However, while demographic information often correlates with customers' needs, it is unlikely that demographics can be used as an explanation of differences in usability requirements. Since demographics are simply descriptions of customers, they cannot explain distinctly non-demographic differences between individuals.

Unlike demographic variables, characterizing consumers based on psychological dimensions (psychographics) provides insight into the lifestyle behavior [60, 61]. By addressing "why" individuals react or behave in certain ways, psychographics offer a more complete profile of a potential (or current) market. Psychographics are often deployed with basic demographic characteristics to develop new products, create product positioning strategies, and target new markets [2, 21, 24, 37].

The literature pertaining to technology adoption suggests that people hold both positive and negative beliefs about technology-based products and services (e.g., [10, 11, 13, 16, 36]). Although paradoxical beliefs may coexist, people can be arrayed along a continuum anchored by strongly positive (highly technology-ready) at one end to strongly negative (highly technology-resistant) at the other [36, 46]. Past research suggests that people's position on the continuum will be correlated with their perceptions about and acceptance of a technology-based product or service [10, 11, 13, 18].

We are specifically interested in the concept of *Technology Readiness (TR)* which reflects four technology beliefs related to a customer's propensity to embrace and use technology-based products and services [46]. Two beliefs – *optimism* and *innovativeness* – contribute to technology readiness, while the other two beliefs – *discomfort* and *insecurity* – inhibit technology readiness. Briefly, *optimism* is a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives. *Innovativeness* reflects the extent to which an individual believes s/he is at the leading edge of trying out new technology-based products or services. *Discomfort* is a perceived lack of control over technology and a feeling of being overwhelmed by it. Here, individuals believe technology is not really designed for use by ordinary people and is simply too complicated. Lastly, *insecurity* reflects an inherent distrust of technology and doubt about its ability to work properly.

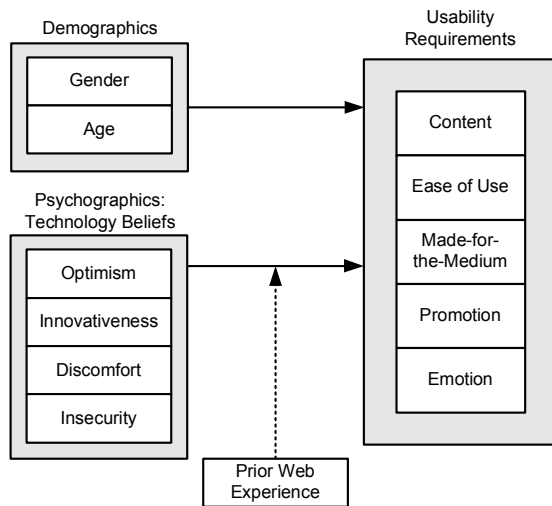
We observe that the ISO definition of usability and the literature related to consumers' beliefs about technology are directly related as both: (a) involve inherently subjective phenomena, i.e., attitudes and

beliefs; (b) are concerned with how users/customers interact with a technology product or service; and (c) focus on the accomplishment of goals via technology.

Importantly, there is also a strong and growing interest in understanding what individuals believe about technology, and how these beliefs can (or should) influence design requirements and ultimately evaluations of success or failure [4, 17, 35, 43, 55]. Underlying this interest is the recognition that beliefs form the foundation for expectations of how things should work (i.e., needs or requirements). While various combinations of technology beliefs can be used to segment online customers into distinct groups², our interest lies in examining the relative influence of technology beliefs – optimism, innovativeness, discomfort, and insecurity – on usability requirements.

3. Model and hypotheses

**Figure 1. Research model:
Customer characteristics and usability requirements**



Our research model is shown in Figure 1. In the following sections, we develop specific hypotheses related to the determinants of usability requirements.

There is a body of IS and marketing research that has shown demographics – particularly gender and age – to be related to technology-related and consumer-related behaviors [38, 57]. For example gender has been shown to be an important predictor of attitudes in

online shopping [6]. This research suggests that men will deem content more important, while women will place a greater emphasis on ease of use. Venkatesh and Agarwal [56] found that made-for-the-medium was more important to men, while emotion was more important to women. Past research does not suggest a difference between men and women with regard to promotion. Thus, we hypothesize:

- H1. *Gender will influence usability requirements such that (a) content and made-for-the-medium will be more important to men, (b) ease of use and emotion will be more important to women, and (c) promotion will be equally important to men and women.*

Similarly, age has been shown to be strongly related to technology adoption and use. In general, older customers have been found to be more concerned with ease of use than younger customers [57]. Since older customers also tend to be more deliberate when considering online products and services [6], we expect content to be more important to them. Recently, Venkatesh and Agarwal [56] found content, ease of use, and made-for-the-medium to be more important to older customers than younger customers. Past research does not suggest a difference between younger and older customers with regard to promotion or emotion. Thus, we hypothesize:

- H2. *Age will influence usability requirements such that (a) content, ease of use, and made-for-the-medium will be more important to older than younger online customers, and (b) promotion and emotion will be equally important.*

With regard to technology beliefs, we expect that the four beliefs (optimism, innovativeness, discomfort, and insecurity) will have differential relative effects on usability requirements. At the same time, past research suggests that prior experience (e.g., with a product or service) strongly influences future needs and behaviors [8, 26]. The HCI literature offers empirical evidence that the level of experience (e.g., novice, expert) possessed by a user plays a key role in subsequent artifact use [7]. Thus, we expect that prior Web experience will moderate the effects of beliefs on usability requirements. Specifically, it will enhance the relative effects of positive beliefs (optimism, innovativeness) and mitigate those of the negative beliefs (discomfort, insecurity).

Optimism is a positive view of technology and a belief that it offers people increased control, flexibility, and efficiency in their lives ([47], p. 34). For example, people may like making electronic purchases via the

² For example, Massey, Khatri, and Montoya-Weiss [35] examined how distinct TR customer segments varied in usability requirements. TR segmentation-based studies have also been examined in a number of other contexts, including consumer markets [48], educational choice [25], and healthcare [52].

Web because they can do so whenever they want. Moreover, these customers want the ability to tailor a product/service to their own needs. Linking optimistic beliefs to usability requirements, we expect ease of use to be tied to efficiency goals, made-for-the-medium is tied to the ability to personalize/tailor websites, and emotion is tied to the customer's ability to control pace. Therefore, we hypothesize:

- H3. *Optimism will influence usability requirements such that ease of use, made-for-the-medium and emotion will be relatively more important than content and promotion.*
- H4. *Prior Web experience will enhance the relative effects of optimism on usability requirements.*

Innovativeness reflects the extent to which an individual believes s/he is at the leading edge of trying out new technology-based products or services ([47], p. 38). Innovative customers tend to focus on the benefits or usefulness of technology. They also want to learn new technology on their own, and may need less support. This suggests that innovativeness is most closely tied to content (e.g., relevance) as it reflects the benefits a customer derives from site use [56]. Conversely, innovative customers may be less concerned with ease of use because they are willing and may even prefer to "figure it out" themselves. Therefore, we hypothesize:

- H5. *Innovativeness will influence usability requirements such that (a) content will be relatively more important than ease of use, made-for-the-medium, emotion, and promotion, and (b) ease of use will be relatively less important than content, made-for-the-medium, emotion, and promotion.*
- H6. *Prior Web experience will enhance the relative effects of innovativeness on usability requirements.*

Discomfort is a perceived lack of control over technology and a feeling of being overwhelmed by it ([47], p. 41). High discomfort means that individuals believe technology is not really designed for use by ordinary people and is simply too complicated. This suggests that the usability requirements of content (i.e., delivering the right depth and breath so as not to overwhelm a customer) and ease-of-use (i.e., structure and feedback) are most related to discomfort beliefs. Therefore, we hypothesize:

- H7. *Discomfort will influence usability requirements such that content and ease of use will be*

relatively more important than made-for-the-medium, emotion, and promotion.

- H8. *Prior Web experience will mitigate the relative effects of discomfort on usability requirements.*

Lastly, *insecurity* reflects an inherent distrust of technology ([47], p. 44). Those who are insecure tend to be concerned about where their information is going or who will see it, particularly in electronic transactions. Of the usability requirements, we expect the ability to personalize/tailor a site via made-for-the-medium and the assurance offered via promotion to be most related to insecure beliefs. The ability to personalize a site may reduce distrust and influence beliefs about sharing information. Similarly, customers may become aware of a web site through their more familiar and secure experiences with a traditional brick and mortar store. Therefore, we hypothesize:

- H9. *Insecurity will influence usability requirements such that made-for-the-medium and promotion will be relatively more important than content, ease of use, and emotion.*
- H10. *Prior Web experience will mitigate the relative effects of insecurity on usability requirements.*

4. Methodology

To test our research hypotheses, 215 subjects were recruited from a campus of a large university in the US Midwest. Participation was voluntary and subjects received a \$20 award for their participation.

In terms of age, 69.3% ranged from 18-25 years old, 25.6% were 26-35, and 5.1% were over 35. In addition, 39.1% of the respondents were female. 4.7% were undergraduate students, 92% were graduate students, and 3.3% were non-student university employees. In addition to the demographic data, we also collected data on individuals' prior Web experience on a four-point scale (with 1= never and 4 = frequently) [31, 42]. The average prior Web experience was 2.73.

Subjects completed a survey used to measure their technology beliefs (on 5-point scale, with 1 = strongly disagree to 5 = strongly agree). Fifteen measures for the four technology beliefs were adapted from [46]. The items are reported in Appendix A. Subjects were given descriptions of the five usability design requirements and, in order to provide context, informed that the focus of the study was the design of online services (e.g., news, mapping and restaurant guides, etc). Following the procedures described in [1], each subject was then instructed to distribute 100 points across the five requirements, thus reflecting the relative importance (i.e., weight) of each design requirement to the subject.

5. Analysis and results

Our analysis was conducted in two steps: (1) a factor analysis (FA) of the technology belief measures, and (2) a series of seemingly unrelated regression (SURE) analyses for hypotheses testing.

5.1 Factor analysis

We conducted factor analysis with varimax rotation and 0.30 as a cutoff to identify items with higher loadings for each factor. All the constructs had reliability greater than 0.70, except for optimism at 0.64³ (see Appendix).

Table 1. Summary statistics

| Technology Beliefs | Mean (SD) | Usability Requirements | Mean (SD) |
|--------------------|-----------------------------|------------------------|-------------------------------|
| Optimism | 4.08 ^x (0.62) | Content | 38.28 ^a (12.89) |
| Innovativeness | 3.27 ^y (0.99) | Ease of Use | 29.63 ^b (10.07) |
| Discomfort | 3.07 ^z (0.91) | Made-for-the-Medium | 15.35 ^c (8.17) |
| Insecurity | 3.06 ^z (0.93) | Promotion | 8.26 ^d (6.39) |
| | | Emotion | 8.53 ^d (5.84) |

Note: The different superscripts denote that the within-subject differences are significant ($p \leq 0.05$).

In Table 1, we present summary statistics for technology beliefs and usability requirements. As shown, for example, subjects' were significantly more optimistic than innovative. Consistent with past research [1, 35, 56, 59], overall subjects placed significantly less importance on promotion and emotion than the other usability requirements.

5.2 SURE analysis

Second, we tested our hypotheses (H1-H10) in a system of five seemingly unrelated regression estimation (SURE) models to maximize the efficiency of the estimation [27] in several steps. SURE [27] is a statistical technique that solves a set of regression equations simultaneously and allows error covariance among the equations. Each SURE analysis involved

five equations, with the usability requirements (content, ease of use, made-for-the-medium, emotion, and promotion) as the dependent variables.

Based on prior research, our first SURE model only included age and gender as predictors. In the second SURE model, we included age, gender, and the four technology beliefs as predictors. Finally, in the third SURE model, we added the interaction term (i.e., prior Web experience). The moderated SURE model tests whether the influence of the technology beliefs on usability requirements differs based on prior Web experience. Comparative model analyses indicated that the hypothesized moderated model structure has superior explanatory power. The final results, shown in Table 2, provide mixed support for our hypotheses.

With regard to the demographic characteristics, we observed no effects for gender on any of the usability requirements. In terms of age, emotion was more important to older customers than younger ones. Thus, contrary to expectations and prior research, H1 and H2 are not supported.

With regard to the psychographic characteristics, our results provide some evidence that beliefs do have differential relative effects on usability requirements, and that, prior Web experience plays a moderating role.

For *optimism*, the standardized regression coefficients indicate that this belief positively influenced the relative importance placed on ease of use and emotion, i.e., they are more important than promotion and content, although the coefficient for emotion is not significant. Contrary to expectations, optimism did not influence the relative importance of made-for-the-medium, i.e., it is not significantly more important than promotion and content. Thus, H3 is partially supported.

Our results indicate that prior Web experience has no significant moderating effect, except for the influence of optimism on the relative importance of ease of use where it had a negative moderating effect, i.e., contrary to expectations, it did not enhance the relative importance of ease of use. Thus, H4 is not supported.

For *innovativeness*, the results in Table 2 suggest that content and ease of use are, respectively, the most and least important usability requirements, as expected. However, since the coefficients are not significant, H5 is not supported. We also observed no significant moderating effect of prior Web experience with regard to innovativeness. Thus, H6 is not supported.

³ The generally agreed upon lower limit for Cronbach's alpha is .70, although it may be decreased to .60 in exploratory research [41, 51].

Table 2. SURE Analysis with prior Web experience effects: Standardized regression coefficients

| Independent Variables | Dependent Variables | | | | |
|----------------------------|---------------------|-------------------|------------------|------------------|------------------|
| | Content | EOU | MFM | Emotion | Promotion |
| Intercept | 0.00 (52.35) | 0.00 (40.96) | 0.00 (33.76) | 0.00 (24.82) | 0.00 (26.75) |
| Gender | 0.03 (1.80) | 0.08 (1.40) | -0.05 (1.16) | -0.07 (0.85) | -0.03 (0.92) |
| Age | 0.11 (1.47) | -0.02 (1.15) | 0.02 (0.95) | -0.12* (0.70) | -0.11 (0.75) |
| Prior Web Experience (EXP) | 0.11 (19.26) | 0.82 (15.07) | -1.11 (12.42) | -0.11 (9.13) | 0.08 (9.84) |
| Optimism | -0.36 (9.28) | 0.87** (7.26) | -0.61 (5.98) | 0.23 (4.40) | -0.04 (4.74) |
| Innovative | 0.78 (6.39) | -0.42 (5.00) | -0.27 (4.12) | -0.41 (3.03) | -0.18 (3.27) |
| Discomfort | 1.14** (7.86) | 0.26 (6.15) | -0.90 (5.07) | -0.65 (3.73) | -0.94* (4.02) |
| Insecurity | -1.39*** (7.54) | 0.15 (5.91) | 1.03* (4.87) | 0.63 (3.58) | 0.68 (3.86) |
| EXP*Optimism | 0.52 (3.42) | -1.26* (2.68) | 0.96 (2.21) | -0.33 (1.62) | -0.07 (1.75) |
| EXP*Innovativeness | -0.98 (2.35) | 0.34 (1.83) | 0.64 (1.51) | 0.56 (1.11) | 0.09 (1.20) |
| EXP*Discomfort | -1.15* (2.89) | -0.58 (2.24) | 1.18* (1.86) | 0.83 (1.37) | 0.95 (1.48) |
| EXP*Insecurity | 1.39** (2.77) | -0.06 (2.17) | -1.04 (1.79) | -0.71 (1.31) | -0.72 (1.42) |
| R ² | 0.12 F=2.55*** | 0.12 F=2.49*** | 0.09 F=1.84** | 0.04 F=0.75 | 0.07 (F=1.29) |

*** significant at $p < 0.01$; ** significant at $p < 0.05$; * significant at $p < 0.1$

For *discomfort*, the results indicate that this belief positively influenced the relative importance placed on content and ease of use, although the coefficient for ease of use is not significant. Both requirements are relatively more important than made-for-the-medium, emotion, and promotion. As expected, promotion is significantly less important. Thus, H7 is partially supported.

Our results indicate that prior Web experience mitigated the relative effects of discomfort. Specifically, it had a significant negative moderating effect with regard to the influence of discomfort on the relative importance of content, and a significant positive moderating effect with regard to made-for-the-medium. Thus, H8 is partially supported.

Finally, for *insecurity*, the results indicate that made-for-the-medium and promotion are relatively more important than content, ease of use, and emotion, although the coefficient for promotion is not significant. Insecurity influences the relative

importance of content such that it is significantly less important than all the other usability requirements. Thus, H6 is partially supported. As expected, prior Web experience mitigated the relative effect of insecurity on content with a significant positive moderating effect. Thus, H10 is partially supported.

6. Discussion and implications

Usability requirements address what is important to customers with regard to the design of online service interfaces. The goal of this study was to empirically investigate the relationship between customer characteristics and usability requirements. Drawing from HCI, IS, and marketing research, we argued that psychographic characteristics will influence usability needs. Specifically, customers' beliefs form the basis for expectations of how online service interfaces should work. Therefore, customer beliefs provide a

foundation for understanding why various aspects of usability may be more (or less) important. Moreover, we argued that prior Web experience will play an important moderating role. While researchers have proposed different usability dimensions [19, 20], in our study we examined specific aspects of usability using the MUG instrument [1].

Our results (Table 2) provide some insight into the influence of customer characteristics on usability requirements. Since the overall F-tests for the usability requirements emotion and promotion were not significant, we will not discuss these further. It is worth noting that past research [1, 57, 59] also found these requirements to be less interesting and important.

Contrary to past research and our hypotheses, Table 2 indicates that demographic characteristics – gender and age – did not influence usability requirements. While our sample was relatively homogeneous in terms of age, our findings concerning gender as compared to beliefs lend credence to our position that non-demographic characteristics provide an alternative perspective on usability requirements.

With regard to the positive technology beliefs, as expected, we found that optimism led to a significant positive effect on the relative importance of ease of use. Here, we also found, contrary to expectations, that the interaction effect with prior Web experience was significant, yet negative. By definition, optimistic customers value efficiency. Thus, they would value ease of use more so than other requirements. However, it may be that with more experience, optimistic customers become less concerned with efficiency and turn their attention to other requirements, i.e., content and made-for-the-medium, as evidenced by the positive coefficients on the interaction terms. Second, contrary to expectations, we found no evidence that innovative beliefs significantly influenced the relative importance of the usability requirements, and prior Web experience played no moderating role.

With regard to the negative beliefs, we found, as expected, that discomfort led to a significant positive influence on the relative importance of content. We also found that the interaction was significant and negative. By definition, discomfort reflects lack of control over technology. Thus, delivering the right depth and breath of content would be more important to such customers. However, via experience, feelings of discomfort abate, thus mitigating the need for these aspects of content. Finally, consistent with our expectations, we found that insecurity led to significant effects on the relative importance of content (negative) and made-for-the-medium (positive). We also found that the interaction effect for content is significant and positive, as expected. For online customers who

distrust technology, the ability to personal helps alleviate this belief.

Overall, Table 2 provides initial evidence that negative beliefs may play a larger role in influencing usability requirements than do positive beliefs. Specifically, the relative importance placed on content is largely shaped by discomfort and insecurity, and their respective interactions with prior Web experience. Similarly, made-for-the-medium is driven by insecurity and the interaction of prior Web experience with discomfort. Our findings extend current thinking in IS regarding the role that technology beliefs play in influencing user requirements [15, 43, 55]. For designers of online service sites, requirements specifications may be incomplete or inaccurate without consideration of underlying customer beliefs, particularly negative ones, thus leading to difficulties during development and implementation.

Overall, our work complements research concerned with serving and marketing to customers through online interfaces [6, 49, 62]. Ultimately, satisfaction and customer adoption behavior will be affected by whether or not the online service interface meets the usability requirements of customers. While demographic characteristics are often used for design and marketing purposes, our results suggest, they may be insufficient as they cannot explain distinctly non-demographic differences.

7. Limitations and research directions

The sample in this study provided both strengths and weaknesses. For example, nearly 95% of the participants were between 18-34 years old, often described as a key target market for technology-based services. While our sample is appropriate given our focus on online services, clearly future research is needed to examine our model with a more diverse sample. For example, while we found no effects on usability requirements with regard to age or gender, other demographics (e.g., income level, education) may be relevant.

The relative demographic homogeneity of our sample, however, highlights the value of psychographics. Specifically, the subjects were diverse in their underlying technology belief structures and these beliefs had differential effects on the relative importance of the various usability requirements. While organizations may have a demographic profile of a target market, understanding the underlying beliefs should become the next goal as they lend deeper insights. With these insights designers of online services may improve usability by focusing on aspects that address particular beliefs.

Finally, in this study, we examined dimensions of usability based on the Microsoft Usability Guidelines. While fairly comprehensive, further research should examine the relationship between customer characteristics and design requirements using alternative conceptualizations of usability found in HCI.

8. Conclusion

Designing interfaces for online services that are responsive to customers' needs is a critical prerequisite for success. However, usability requires not only a perspective on design aspects, but also on customers themselves. The goal of this research was to extend recent usability research [1, 58, 59] by investigating the relationship between customer characteristics and usability requirements. In our study, in addition to considering demographic characteristics, we examined the role of psychographic characteristics – specifically, customers' beliefs about technology. Our approach acknowledges that not all customers are the same or motivated by the same beliefs. Here, we examined the relative influence of four technology beliefs – optimism, innovativeness, discomfort, and insecurity – on usability requirements. In doing so, we also considered the moderating role of prior Web experience. While much work remains regarding the link between customer characteristics and usability requirements, we hope that our efforts reported here will be a stimulus for further research.

9. References

- [1] R. Agarwal and V. Venkatesh, "Assessing a firm's web presence: A Heuristic evaluation procedure for the measurement of usability," *Information Systems Research*, vol. 13, no. 2, pp. 168-186, 2002.
- [2] K. Ailawadi, S. Neslin, and K. Gedenk, "Pursuing the value-conscious consumer: Store brands versus national brand promotions " *Journal of Marketing* vol. 65, no. 1, pp. 71-89, 2001.
- [3] B. Ballard and B. Miller, "WML Style Guide for the Phone.com 4.X Browser™," Sprint PCS White Paper 2001.
- [4] S. R. Barley, "Technology as an occasion for structuring: Evidence from observation of CT scanners and the social order of radiology departments " *Administrative Science Quarterly* vol. 31, 78-108, 1986.
- [5] T. Beane and D. Ennis, "Market segmentation: A review," *European Journal of Marketing*, vol. 21, no. 5, pp. 20-24, 1987.
- [6] R. Burke, "Technology and the customer interface: What consumers want in the physical and virtual store," *Journal of Academy of Marketing Science*, vol. 30, no. 4, pp. 411-432, 2002.
- [7] S. K. Card, T. P. Moran, and A. Newell, *The Psychology of Human-Computer Interaction* Hillsdale, NJ Lawrence Erlbaum Associates, 1983.
- [8] R. Celci and J. S. Olson, "The role of involvement in attention and comprehension processes " *Journal of Consumer Research*, vol. 15, no. 1, pp. 210-224, 1988
- [9] P. Y. K. Chau, M. Cole, A. P. Massey, M. Montoya-Weiss, and R. M. O'Keefe, "Cultural differences in the online behavior of consumers," *CACM*, vol. 45, no. 10, pp. 138-143, 2002.
- [10] D. Cowles, "Consumer perceptions of interactive media," *Journal of Broadcasting and Electronic Media*, vol. 33, 83-89, 1989.
- [11] D. Cowles and L. Crosby, "Consumer acceptance of interactive media in service marketing encounters " *Service Industries Journal* vol. 10, 521-540, 1990.
- [12] D. Cunliffe, "Developing usable Web sites: A review and model," *Internet Research*, vol. 10, no. 4, pp. 295-305, 2000.
- [13] P. Dabholkar, "Incorporating choice into an attitudinal framework: Analyzing models of mental comparison processes," *Journal of Consumer Research*, vol. 21, 100-118, 1994.
- [14] P. Dabholkar, "Consumer evaluations of new technology-based self service options: An investigation of alternative models of service quality," *International Journal of Research in Marketing*, vol. 13, no. 1, pp. 29-51, 1996.
- [15] P. Darke and G. Shanks, "User Viewpoint Modelling: Understanding and Representing User Viewpoints During Requirements Definition," *Information Systems Journal* vol. 7, 213-239, 1997.
- [16] F. Davis, R. Bagozzi, and P. Warsaw, "User acceptance of computer technology: A comparison of two theoretical models," *Management Science*, vol. 35, no. 8, pp. 982-1003, 1989.
- [17] G. DeSanctis and M. S. Poole, "Capturing the complexity in advanced technology use: Adaptive structuration theory " *Organization Science*, vol. 5, no. 2, pp. 121-147, 1994.
- [18] M. Eastlick, "Consumer intention to adopt interactive teleshopping," Marketing Science Institute working paper, Cambridge, MA #96-113, 1996.
- [19] J. Eighmey and L. McCord, "Adding value in the information age: Uses and gratifications of sites on the World-Wide Web " *Journal of Business Research* vol. 41, no. 3, pp. 187-194, 1998.
- [20] D. Gehrke and E. Turban, "Determinants of successful Website design: relative importance and recommendations for effectiveness " presented at Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences, Maui, Hawaii, 1999.
- [21] F. W. Gilbert and W. E. Warren, "Psychographic constructs and demographic segments "

- Psychology & Marketing* vol. 12, no. 3, pp. 223-237, 1995.
- [22] W. D. Gray and M. C. Salzman, " Damaged merchandise? A review of experiments that compare usability evaluation methods," *Human-Computer Interaction*, vol. 13, no. 3, pp. 203-261, 1998.
- [23] D. Hawkins, R. Best, and A. Coney, *Consumer behavior: Implications for marketing strategy*. Chicago, IL: Irwin, 1995.
- [24] R. P. Heath, "The frontiers of psychographics," *American Demographics*, vol. 18, no. 7, pp. 38-44, 1996.
- [25] J. Hendry, "Technology readiness and educational choice: Is there a relationship between technology readiness and the decision to study on-line?," presented at ANZMAC 2000 Visionary Marketing for the 21st Century, 2000.
- [26] S. J. Hoch and J. A. Deighton, "Managing What Consumers Learn From Experience " *Journal of Marketing* vol. 53 no. 2, pp. 1-20, 1989
- [27] J. Johnston, *Econometric methods*, 3rd ed. New York: McGraw-Hill, 1984.
- [28] J. Karat, "Evolving the scope of user-centered design," *Communications of the ACM*, vol. 40, 33-38, 1997.
- [29] L. Karkkainen and J. Laarni, "Designing for small display screens," presented at Proceedings of NordChi, 2002.
- [30] K. Keeker, "Improving Web-site usability and appeal," 1997.
- [31] R. E. Kraut, T. Mukhopadhyay, J. Szczypula, S. Kiesler, and W. Scherlis, "Information and communication: Alternative uses of the Internet in households " *Information Systems Research*, vol. 10, no. 4, pp. 287-303, 1999.
- [32] J. Lam and M. Lee, "A model of Internet consumer satisfaction: Focusing on the Web-site design " presented at Proceedings of the 5th American Conference on Information Systems Milwaukee, WI, 1999.
- [33] A. Lecerof and F. Paternò, "Automatic Support for Usability Evaluation " *IEEE Transactions on Software Engineering* vol. 24, no. 10, pp. 863-888, 1998.
- [34] G. L. Lohse and P. Spiller, "Electronic Shopping," *Communications of the ACM*, vol. 41, no. 7, pp. 81-88, 1998.
- [35] A. P. Massey, V. Khatri, and M. Montoya-Weiss, "Usability of Online Services: The Role of Technology Readiness and Context," *Decision Sciences Journal*, vol. 38, no. 2, pp. 277-308, 2007.
- [36] D. G. Mick and S. Fournier, "Paradoxes of technology: Consumer cognizance, emotions and coping strategies," *Journal of Consumer Research*, vol. 25, no. September, pp. 123-147, 1998.
- [37] V. W. Mitchell, "How to identify psychographic segments," *Marketing Intelligence & Planning*, vol. 12, no. 7, pp. 4-10, 1994.
- [38] F. Morton, F. Zettlemeyer, and J. Silva-Risso, "Internet car retailing " *Journal of Industrial Economics* vol. 49, no. 4, pp. 501-519, 2001.
- [39] J. Nielsen, "User interface directions for the Web " *Communications of the ACM* vol. 42, no. 1, pp. 65-72, 1999.
- [40] J. Nielsen, *Designing Web Usability* Indianapolis, IN: New Riders, 2000.
- [41] J. C. Nunnally, *Psychometric theory*. New York: McGraw-Hill, 1967.
- [42] R. M. O'Keefe, M. Cole, P. Chau, A. P. Massey, M. Montoya-Weiss, and M. Perry, "From the user interface to the customer interface: Results from a global experiment," *International Journal of Human Computer Studies*, vol. 53, no. 4, pp. 611-628, 2000.
- [43] W. J. Orlikowski and D. C. Gash, "Technological frames: making sense of information technology in organizations," *ACM Transactions on Information Systems* vol. 12, no. 2, pp. 174-207 1994.
- [44] U. R. Orth, M. McDaniel, T. Shellhammer, and L. Kannapon, "Promoting brand benefits: The role of consumer psychographics and lifestyle " *The Journal of Consumer Marketing* vol. 21 no. 2/3, pp. 97-108, 2004.
- [45] J. Palmer, "Web site usability, design, and performance metrics," *Information Systems Research*, vol. 13, no. 2, pp. 151-167, 2002.
- [46] A. Parasuraman, "Technology-Readiness Index (TRI): A multiple-item scale to measure readiness to embrace new technologies," *Journal of Service Research*, vol. 2, no. 4, pp. 307-320, 2000.
- [47] A. Parasuraman and C. L. Colby, *Techno-ready marketing: How and why customers adopt technology*. New York, NY: The Free Press, 2001.
- [48] A. Parasuraman and D. Grewal, "Serving customers and consumers effectively in the 21st century: A conceptual framework and overview " *Journal of the Academy of Marketing Science*, vol. 28, no. 1, pp. 9-16, 2000.
- [49] A. Parasuraman and G. M. Zinkhan, "Marketing to and serving customers through the Internet: an overview and research agenda," *Journal of the Academy of Marketing Science*, vol. 30, no. 4, pp. 286-295, 2002.
- [50] M. Price, "What makes users revisit a Web site? ," in *Marketing News*, 1997, pp. 12.
- [51] J. P. Robinson, P. R. Shaver, and L. S. Wrightsman, *Measures of Personality and Social Psychological Attitudes*. San Diego, CA: Academic Press, 1991.
- [52] J. Rosen, V. Mittal, B. Mulsant, H. Degenholtz, N. Castle, and D. Fox, "Educating families of nursing home residents: A pilot system using a computer-based system " *Journal of the American Medical Directors Association* vol. May/June 128-134, 2003.
- [53] W. Smith, "Product differentiation and market segmentation as alternative marketing strategies " *Journal of Marketing* vol. 21, no. 3, pp. 3-8, 1956.

- [54] D. Straub and R. Watson, "Transformational issues in researching IS and net-enabled organizations," *Information Systems Research* vol. 12 no. 4, pp. 337-345, 2001.
- [55] F. B. Tan and M. G. Hunter, "The RepertoryGrid Technique: A Method for the Study of Cognition in Information Systems " *MIS Quarterly*, vol. 26, 39-57, 2002.
- [56] V. Venkatesh and R. Agarwal, "From Visitors to Customers: A Usability-Centric Perspective on Purchase Behavior in Electronic Channels," *Management Science*, vol. 52, no. 3, pp. 367-382, 2006.
- [57] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: Toward a unified view," *MIS Quarterly*, vol. 27, no. 3, pp. 425-478, 2003.
- [58] V. Venkatesh, V. Ramesh, and A. P. Massey, "'e ≠ m": Ramifications for wireless design," *Communications of the ACM*, vol. 46, no. 12, pp. 53-56, 2003.
- [59] V. Venkatesh and R. Venkataraman, "Web and Wireless Site Usability: Understanding Differences and Modeling Use," *MIS Quarterly*, vol. 30, no. 1, pp. 181-206, 2006.
- [60] W. D. Wells, "Psychographics: A critical review," *Journal of Marketing Research*, vol. 12, 196-213, 1975.
- [61] W. D. Wells and T. J. Tigert, "Activities, interests and opinions," *Journal of Advertising Research* vol. 2, 27-35, 1971.
- [62] V. A. Zeithaml, A. Parasuraman, and A. Malhotra, "Service quality delivery through Web sites: a critical view of extant knowledge," *Journal of the Academy of Marketing Science* vol. 30, no. 4, pp. 362-375, 2002.

APPENDIX

Technology Beliefs: Measurement Items and Construct Reliabilities

Optimism (Reliability .64)

1. Technology gives people more control over their daily lives.
2. I like the idea of doing business via computers because I am not limited to regular business hours.
3. Technology makes me more efficient in my occupation.
4. Technology gives me more freedom of mobility.

Innovativeness (Reliability .85)

1. Other people come to me for advice on new technologies.
2. I can usually figure out new high-tech products and services without help from others.
3. I keep up with the latest technological developments in my areas of interest.
4. I enjoy the challenge of figuring out high-tech gadgets.

Insecurity (Reliability .75)

1. If I provide information over the Internet, I can never be sure it really gets to the right place.
2. I do not consider it safe giving out a credit card number over a computer.
3. I worry that information I send over the Internet will be seen by other people.
4. Any business transaction I do electronically should be confirmed later with something in writing.

Discomfort (Reliability .71)

1. Technical support lines are not helpful because they don't explain things in terms I understand.
2. There is no such thing as a manual for a high-tech product or service that's written in plain language.
3. If I buy a high-tech product/service, I prefer to have the basic model over one with a lot of extra features.

All 5-point Likert scales (1=strongly disagree to 5=strongly agree)