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ABSTRACT

This research examines the area of Online Consumer Health Information Retrieval (HIR) as: "a field of study that pertains to consumers' use of the Internet to locate and evaluate health related information, for the purposes of self education and collection of facts to enable informed decision making." A research model exploring the antecedents of consumer satisfaction with online HIR is developed by using the constructs quality, trust beliefs and satisfaction. This model for consumer satisfaction with online HIR is quantitatively validated using structural equation modeling techniques. The findings of this research provide evidence that content quality, technical adequacy and trust beliefs explain a large proportion of the variance in satisfaction with online HIR for consumers.

Keywords

Health information retrieval, information quality, system quality, trust beliefs, satisfaction.

INTRODUCTION

The Internet has enabled consumers to become more proactive in managing their health by accessing information published online. Several studies of this phenomenon (Harris Interactive 2002; HON 2005; Lawry 2001; Sciamanna et al. 2002) have indicated that a large percentage of the population is now utilizing information found on the Internet to educate themselves and to make and reinforce decisions about medications, treatments and lifestyle choices for themselves and others.

The quality of health information posted on the Internet has been a concern for many physicians and academics. In the research of Eysenbach et al. (2002) 79 studies on this issue were reviewed systematically to arrive at two major conclusions. First, although quality has been expressed using accuracy, completeness, readability, design, disclosures, and references provided as criteria, the term quality requires a better operational definition for cross study comparisons. Second, the majority (70%) of research studies on the quality of health information on the Internet stated that quality is a problem on the Web.

While the existing body of literature on online health information suggests specific measures for quality, it is evident that the basis for the quality of health information comes from medical professionals and academics in this body of literature. What is missing is an understanding of how consumers evaluate the quality of HIR. This research draws upon literature from the information systems (IS) and human computer interaction (HCI) domains to explore constructs that impact the satisfaction of online HIR from a consumers' perspective.

RESEARCH MODEL AND HYPOTHESES

We propose the model depicted in Figure 1 to investigate the factors that influence overall consumer satisfaction with online HIR. The proposed model incorporates several constructs that we theoretically link to overall satisfaction with online HIR in the following subsections.
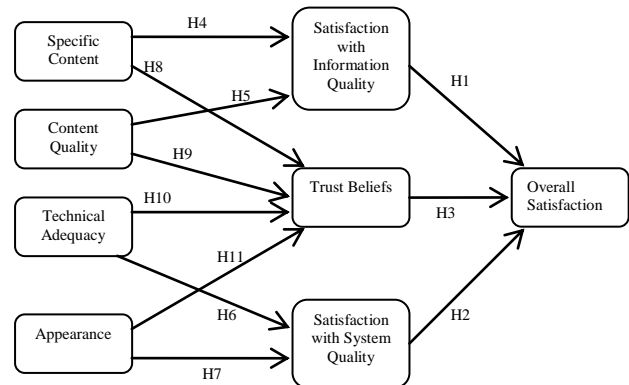

Figure 1. Research Model

Overall Satisfaction with HIR and its Determinants

User satisfaction is an effective way to determine IS success (Zviran et al. 2003), and satisfaction is especially important in the context of consumer HIR, as it is not only indicative of future usage (Doll et al. 1988) of specific Websites, which is interesting in itself, but also predictive of whether or not consumers will act upon the health information they retrieve online.

In a review of the use of satisfaction in IS research, Khalifa and Liu (2004) classify antecedents of user satisfaction as being technical or semantic, which can also be viewed as system quality and information quality (McKinney et al. 2002; Wixom et al. 2005).

Another antecedent to satisfaction is trust, which is more important for consumer-oriented Internet-based

information systems (i.e. Websites) than organizational information systems, because of the increased uncertainties about the credibility and intentions of information providers Online.

In the eBusiness context, it has been found that trust is a vital factor to predicting satisfaction, leading to purchase intention (Kim et al. 2003). It is expected that trust is equally important in the online HIR context, due to the great variability of online health information sources with often contradictory opinions, and the observation that trust is important to satisfaction in relationships between patients and doctors (Baker et al. 2003; Keating et al. 2002).

Empirical research by McKnight et al. (2002) found that trusting beliefs could explain most of the variance in trusting intention. Trusting beliefs are also the most frequently investigated trust construct in empirical studies (Grabner-Krauter et al. 2003). Therefore, trust beliefs and its dimensions will be adopted in this research model.

Based on the forgoing discussion, overall satisfaction with online HIR is suggested to be derived from satisfaction with the information quality, satisfaction with the Web site system quality (McKinney et al., 2002) and the trust beliefs towards the Website and its owners/authors (Huntington et al., 2004). This is similar to the findings of Toms and Taves (2004) who found that trustworthiness, aboutness and authoritativeness impact consumers' willingness to return to a Website. Thus we propose the following three hypotheses related to overall satisfaction with HIR:

H1: A higher level of satisfaction with information quality leads to a higher level of overall satisfaction with HIR

H2: A higher level of satisfaction with system quality leads to a higher level of overall satisfaction with HIR

H3: A higher level of trust beliefs leads to a higher level of overall satisfaction with HIR

Satisfaction with Information Quality

In this research model information quality contains two separate dimensions; specific content and content quality. Specific content is information about the Website and authors such as contact information, privacy policies, and support information (Aladwani and Palvia, 2002). Content quality is assessed as usefulness, clarity, completeness, currency, conciseness, and accuracy. Content quality is a subjective evaluation and can also be seen as relevance which has been found to have a significant impact on ease of use and usefulness of digital information retrieval systems (Thong et al., 2002), as well as on the intention to use the information (Greisdorf, 2003) which is related to satisfaction with the information. It is expected that consumers will utilize these factors consciously or subconsciously to determine their level of satisfaction with the information as similar research has shown a causal link between Website features and information

satisfaction (Muylle et al., 2004) and thus we propose the following hypotheses:

H4: A higher level of perceived specific content leads to a higher level of satisfaction with information quality

H5: A higher level of perceived content quality leads to a higher level of satisfaction with information quality

Satisfaction with System Quality

System Quality is defined in this research model to have the two dimensions; technical adequacy and appearance. The technical adequacy of a Website comprises aspects such as the speed with which pages load, searching capabilities, personalization and customization features, and the ease of accessing the site (Aladwani and Palvia, 2002). The appearance dimension of system quality includes overall attractiveness, organization, proper use of fonts, proper use of colors, and proper use of multimedia (Aladwani and Palvia, 2002). Prior research has found that technical aspects and design elements impact perceptions of quality and satisfaction with Websites (van Iwaarden et al., 2004, Kim and Stoel, 2004). It is expected that consumers will utilize these factors consciously or subconsciously to determine their level of satisfaction with the system quality and thus we propose the following hypotheses :

H6: A higher level of perceived technical adequacy leads to a higher level of satisfaction with system quality

H7: A higher level of perceived appearance leads to a higher level of satisfaction with system quality

Trust Beliefs

Within the online HIR context, consumers must decide whether they trust the accuracy of the information on health Websites, which relates to whether their confidence in the credibility of the authors of the information and the intentions of the site posting it. For example, many commercial Websites posting health information have an agenda of promoting specific products or services, which can bias the advice given by the site (Reed et al. 2002).

Trust beliefs are built upon the impressions consumers have of the Website. These impressions are quantified in the constructs specific content, content quality, technical adequacy, and appearance. Theoretical research such as that by Corritore et al. (2003) supports this idea, proposing that trust is formed by users' perceptions of credibility, ease of use and risk of Websites. Prior qualitative research has recognized that the features of a Website can influence the trust or mistrust of health information Websites (Sillence et al., 2004). Quantitative research on consumer trust in health information on the Web has also concluded that the features and contents of WebPages impact consumers' willingness to trust and utilize the information they found (Huntington et al., 2004). It is proposed that these subjective evaluations of performance measures relate to the perceptions of trust beliefs, and the following hypotheses are suggested:

H8: A higher level of perceived specific content leads to a higher level of trust beliefs

H9: A higher level of perceived content quality leads to a higher level of trust beliefs

H10: A higher level of perceived technical adequacy leads to a higher level of trust beliefs

H11: A higher level of perceived appearance leads to a higher level of trust beliefs

METHODOLOGY AND MEASURES

This research utilizes structural equation modeling (SEM) in order to examine the relationships between the constructs in the research model. SEM uses a combination of factor analysis and path analysis to explore theoretical constructs which are represented by latent factors (Hox and Bechger, 1998). SEM is a method of performing confirmatory factor analysis, which is appropriate in this research because it draws upon existing constructs and has the objective of examining the relationships between these constructs (Bandalos, 1996). Construct items are adapted from instruments found in prior studies (Jarvenpaa et al., 2000, Toms and Taves, 2004, McKinney et al., 2002, Aladwani and Palvia, 2002).

DATA COLLECTION METHOD

The research model was validated through an online experiment. The goal of the experiment was to examine the impact of the factors Specific Content, Content Quality, Technical Adequacy, and Appearance on the second order constructs leading to Overall Satisfaction with online HIR. As such, the method of manipulating the exogenous constructs in the model was to create treatments by varying the information seeking scenario and the Website so that variation among the exogenous constructs is achieved.

With four exogenous constructs, 16 treatments are needed to achieve a full factorial design. As this is impractical, in this study eight treatments (shown in Table 1) comprising two different scenarios and eight different Websites were chosen following a 2^{4-1} fractional factorial design, which exploits the redundancy in terms of an excess number of interactions (Box et al., 1978). Websites were chosen to vary the four exogenous constructs in our model based on pre-test results and expert assessments. The two scenarios were selected to vary the degree of prior knowledge subjects had of the topic. Subjects were recruited online through a university news Website and invitations posted in parenting forums. 170 subjects ranging in age from 18 to 55 completed the experiment, with 50% older than 25 years old.

Website	Scenario
http://www.healthbulletin.org	Asthma
http://www.drweil.com	Phentermine
http://www.pillstore.com	Phentermine
http://www.medicinenet.com/	Phentermine
http://www.drkoop.com/	Asthma
http://www.canadian-health-network.ca	Phentermine
http://www.lung.ca/	Asthma
http://www.mayoclinic.com/	Asthma

Table 1. Experimental Treatments

DATA ANALYSIS AND RESULTS

Measurement Model Evaluation

This research follows the procedure by Diamantopoulos and Winklhofer (2001) for the evaluation of the four formative constructs in the research model: Technical Adequacy, Content Quality, Specific Content, and Appearance. Indicators for these constructs are examined for multicollinearity, and external validity using both linear regression and PLS models with two construct Multiple Indicators, Multiple Causes (MIMIC) models (Burke Jarvis et al., 2003, Diamantopoulos and Winklhofer, 2001). No evidence of multicollinearity was present as the item-item correlations were all below 0.7 and the highest variance inflation factor (VIF) was 2.5, well below the suggested cut-off of 0.8 for correlations and 5.0 for VIFs (Kleinbaum et al., 1988, Stevens, 1996).

The constructs in the research model were evaluated for consistency by performing a bootstrap in PLS Graph using 500 bootstrap resamples. All the reflective constructs had a component reliability above the recommended 0.70 level (Nunnally, 1978), suggesting internal consistency. The convergent validity for the reflective constructs was also confirmed, as the average variance extracted (AVE) was above the guideline of 0.5 (Fornell and Larcker, 1981).

Discriminant validity was examined by comparing the correlation matrix and square root of the average variances extracted, which was found to be adequate, since the square root of the AVE was larger than correlations between constructs (Compeau et al., 1999). Additionally discriminant validity was confirmed by examining how the items in the model correlate to their constructs and on other constructs as described by Gefen and Straub (2005).

Structural Model Evaluation

The structural model was evaluated using PLS Graph version 3.00. Figure 2 shows all the path coefficients and variance explained in the Research Model.
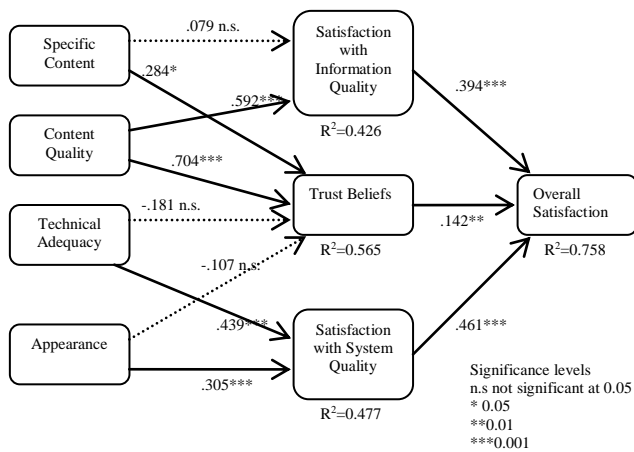
Figure 2. PLS Structural Model

Results from our PLS model showed that Satisfaction with Information Quality has a significant positive effect on Overall Satisfaction (β=.394), as does Satisfaction with System Quality (β=.461), and Trust Beliefs (β=.142). Specific Content. Specific Content had a significant positive effect (β=.284) on Trust Beliefs, but no significant effect on Satisfaction with Information Quality. Content Quality had positive significant effects on both Satisfaction with Information Quality (β=.592) and on Trust Beliefs (β=.704). Both Technical Adequacy and Appearance had no significant effects on predicting Trust Beliefs. There were positive significant effects Technical Adequacy (β=.439), and Appearance (β=.305) on Satisfaction with System Quality.

DISCUSSION AND CONCLUSIONS

The objective of this research was to develop and empirically validate a model explaining consumers' satisfaction with online HIR. This was achieved through the adaptation of theoretical linkages and constructs from HCI and IS literature, and application of IS statistical methods. Through the application of partial least squares structural equation modeling techniques, it was found that the main determinants of consumers' satisfaction with online HIR were content quality and technical adequacy. Trust beliefs played a smaller, but still significant role in that regard. Website appearance was also found to have a small effect on Satisfaction with System Quality, which in turn had a large effect on Overall Satisfaction with online HIR. The importance of Specific Content was smallest in these quantitative results.

These findings indicate that consumers' satisfaction online HIR can be best predicted based on the perceived quality of the information on the Website and the perceived technical adequacy of the Website. The Appearance of the Website plays a minor role in predicting online HIR satisfaction, and specific content, such as privacy policies, and contact information is the least important in predicting online HIR satisfaction. Specific content did lead towards explaining some of the trust beliefs respondents had towards the Websites in the

experiment. This provides evidence that it is important for Websites to provide specific content to give their visitors a favourable impression about their trustworthiness.

The research model proposed and validated in this paper was specifically tested in the online HIR context. It is possible that the model is equally valid in other contexts of online information retrieval, such as online shopping, or online news for example.

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