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Chulmo Koo

Chosun University, helmetgu@gmail.com

Yulia Wati

Chosun University, yuliawati@gmail.com

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E-HEALTHCARE AND KNOWLEDGE-INTENSIVE WEBSITE: AN EMPIRICAL STUDY OF NATIONAL CANCER CENTER (NCC), SOUTH KOREA

Chulmo Koo, College of Business, Chosun University, South Korea, helmetgu@gmail.com

Yulia Wati, College of Business, Chosun University, South Korea, yuliawati@gmail.com

Abstract

The fact that the patient satisfaction with primary care clinical practices and physician-patient communications has been decreased gradually has brought a new opportunity to online channel as a supplementary service to provide additional information. In this study, we adopted Expectation-Confirmation Theory (ECT) to examine the process of cognitive knowledge expectation-confirmation of e-healthcare users and recommended the attributes of “knowledge-intensive website”. An empirical study was conducted at the National Cancer Center (NCC), South Korea by evaluating its official website. The results indicated that all of our hypotheses were accepted: both pre-knowledge expectations and perceived performance (information quality, information presentation, and website attractiveness) positively influenced knowledge confirmation; knowledge confirmation had a positive and significant effect on perceived usefulness (post-expectations); and together with pre-expectations, both of these variables influenced user satisfaction. Discussion and implications for future research were also provided.

Keywords: e-Healthcare, National Cancer Center, Knowledge-intensive website, perceived performance, end-user satisfaction, Expectation-Confirmation Theory

1 INTRODUCTION

The internet is rapidly growing and increasingly used as an open, anonymous, and democratic means of health information source (Bates et al. 2006) and knowledge (Blinn et al. 2010). Several studies (e.g. Fox 2006; Sciamanna et al. 2002) have reported that a large percentage of the population now refers to the internet to find health related information as their self-reference (Bliemel and Hassanein 2007). The fact that the patient satisfaction with primary care clinical practices and physician-patient communications (Safran 2003) has been decreased gradually has brought a new opportunity to online channel as a supplementary service to provide additional information (Altinkemer et al. 2006). That is, the knowledge of what consumers find as satisfactory information in the health context has great implications, as customer may act seriously upon this information (Bliemel and Hassanein 2007).

On the other hand, the observation studies find that internet users often pay little attention to source credibility when seeking out health information on the web (Bates et al. 2006) and a lot of available information is poor quality (Bliemel and Hassanein 2007). Therefore, to ensure the best, most accurate timely, and relevant information is used by consumers, health care organizations have an obligation to attract users to this information (Bates et al. 2006). With this regard, the information system discipline has been also called to develop theories and methods that should prove usefulness of information in e-healthcare service (Chang et al. 2007). Among the limitation of e-healthcare literature from IS perspective, there is no in-depth participatory design research on hospital or healthcare website (Gallant et al. 2007) and research is still lacking on the design features and development practices of consumer health information websites (Ketchum 2005).

The main purpose of this study is to theorize the attributes of “knowledge-intensive website” of e-healthcare based on Expectation-Confirmation Theory (ECT), and integrate the concept with prior IS research. In order to maximize the function of website as a knowledge and information source, we measure the website effectiveness empirically by emphasizing on the information as knowledge element of e-health service as the benefits of healthcare are highly associated with the intrinsic value of information (Fitterer et al. 2010). Secondly, we study patients and or end-users’ online behaviour and investigate factors affecting their satisfaction toward information provided by healthcare website from IS perspective. This study adopted Expectation-Confirmation Theory (ECT) to examine the process of cognitive knowledge expectation-confirmation of e-healthcare users. Even though ECT has been widely used in marketing literature to study customer satisfaction (e.g. Anderson 1994), post-purchase behaviour and or service marketing (e.g. Oliver 1980, 1993), and IS study (e.g. Bhattacharjee 2001; Chiu et al., 2005; Khalifa and Liu 2003; McKinney et al. 2002), however, there is lack of study testing this theory for e-healthcare service. To achieve our purposes, we carried out an empirical study at National Cancer Center (NCC), South Korea by evaluating its official website. By considering the fact that among people with cancer, the internet has become a major source of health information (e.g. Huang and Penson, 2008), the chosen website is appropriately fit our proposed model of “knowledge-intensive website”. In addition, as a government funded institution, NCC website may be used to evaluate acceptable criteria of knowledge-intensive website.

The research reported here also makes several contributions to both research and practice. From a theoretical perspective, we presented the concept of “knowledge-intensive website” of e-healthcare. We proposed and validated a range of criteria needed to establish knowledge-based website as a main information source for patients and or internet users. Second, it extends the ECT under e-healthcare context to explain how initial knowledge expectation and perceived performance influenced the knowledge confirmation as an actual knowledge outcomes gain by users after assessing the information, and how these factors influenced post-consumption expectations that may lead to improved consumers’ satisfaction, which has not been examined in previous literature. Third, this paper focused on the important of information and knowledge of e-healthcare website, which is a new paradigm in e-healthcare research area.

This paper is organized as follows: we begin by presenting the theoretical framework of electronic healthcare in South Korea, followed by presenting and analyzing Expectation Confirmation Theory.

In the third section, we described our research model and hypotheses development. Furthermore, in the fourth section, we provided a description of the methodology that we relied upon to select and analyze the data. Thus, in the fifth section, we presented the results of data analysis. The sixth section presented the discussion of study's key findings and its limitation. And in last section, implications and future research were also discussed.

2 LITERATURE REVIEW

2.1 E-Healthcare and South Korea

According to Eysenbach (2001, E20), "*e-health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology*". Altinkemer et al. (2006) posit that the major benefits of online healthcare service for patients include a greater degree of control over medical records, the ability to compose questions better, save e-mails archives in order to re-read instructions, and provide a less intimidating venue caused by the relative anonymity which may allow patients to be more comfortable in asking questions they may not ask during physical meeting.

Korea has one of the most advanced IT technologies and infrastructure in the world (Lee et al. 2009). This fact has support the diffusion of e-health technology not only in domestic region, but also outside the country. In 2008, e-health has become one of important growth industries for the Korean economy (Lee et al. 2009). As one of the initial public healthcare services in this country, National Cancer Center, initiated Ministry of Health and Welfare also delivers its service through internet. One of the main functions of this website is providing cancer information in various forms, including electronic learning, e-book, multimedia presentation, and testimonial content (NCC 2009). As cancer is a common cause of death, and its rate is expected to increase in Korea (NCC 2009), the effort to empirically study their method to deliver the information may bring a good implication for both research and practice as we proposed in the previous section.

2.2 Expectation Confirmation Theory (ECT)

The expectancy (dis)confirmation paradigm is primarily cognitive in nature because the comparison process in (dis)confirmation judgments requires the deliberate processing of information (Oliver 1980). The process of expectation-confirmation in marketing concept is begun with the initial expectations of a specific product or service they may gain prior to purchase. Thus, they accept and use the product or service. Following a period of initial consumption, they form perceptions about its performance, whether the product or service meet their expectation. Furthermore, they assess its perceived performance compared with their original expectations and determine the extent to which their expectation is confirmed. Because a customer's expectations and perception of performance can vary from one to another, confirmation can be positive when actual performance is higher than pre-expectation and the consumer is satisfied, or confirmation can be negative when perceived performance falls short of pre-expectations and thus, the consumer will be dissatisfied. In turn, this satisfaction/dissatisfaction level will influence behaviour intention (Bhattacharjee. 2001). However, the concept of expectations has raised an ambiguity debate among the scholars. Firstly, the definitions of expectations are varies, ranging from the "will expectation" concept, the "should expectation", to the "ideal expectation" concept. The "will expectation" focuses on forecasting or predicting future performance while the "should expectation" indicated a normative standard for performance (Liao et al. 2007; McKinney et al. 2002). Secondly, this theory ignores the possibility of consumers' expectation dynamic changes as a consequence of their experience and the impact of these changes on subsequent cognitive processes (Bhattacharjee 2001). To tackle with these limitations, we measured

both pre- and post- expectations in one model. Additionally, we conceptualized our expectations as “will expectation” that might have positive impact on confirmation under “met expectation” condition.

3 RESEARCH MODEL AND HYPOTHESIS

3.1 Research Model

The conceptual model which presents the hypothetical relationships is illustrated in figure 1 below. This model shows how knowledge expectations and perceived website performance (information quality, information presentation, and website attractiveness) can influence knowledge expectation, which lead to perceived usefulness and end user satisfaction. On the basis of ECT, we indicated knowledge expectation as pre-consumption variable (t1), and the rest variables as post-consumption variables (t2). The description of each construct presented in this model can be seen in table 1 below.

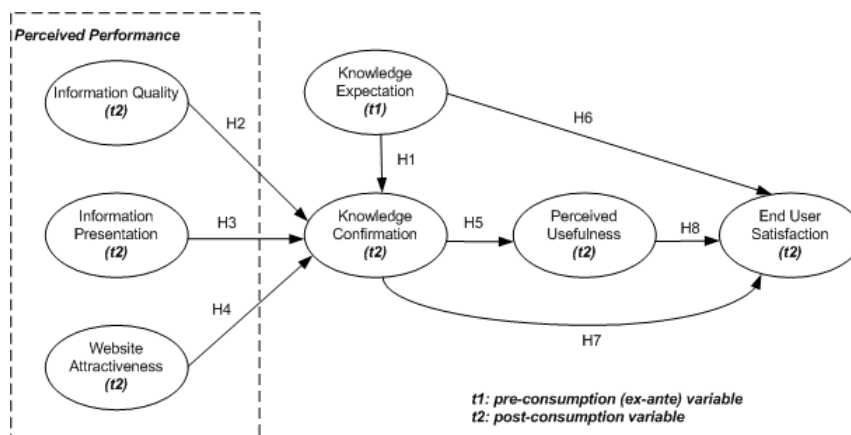


Figure 1. Research Model

Construct	Definition
Knowledge expectation (Johnson et al. 1995; Oliver 1980)	Customers’ existing attitudes or beliefs regarding prior-expected levels of knowledge they may gain by accessing the website
Knowledge confirmation (Bhattacharjee 2001)	A cognitive belief (the extent to which user’s knowledge expectation of IS use is realized during actual use) derived from prior IS use.
Information quality (DeLone and McLean 2003)	Quality of the information system output.
Information presentation (Rai et al., 2002; Zhang and von Dran, 2002)	The degree to which information presentation effectively facilitates interpretation and understanding
Website attractiveness (Montoya-Weiss et al. 2003; Zhang and von Dran, 2002)	Website’s graphic style, the tangible aspect of the online environment that reflects the “look and feel” of the website
Perceived usefulness (Davis 1989)	People’s salient beliefs that using the technology (website) will enhance his or her job performance.
Consumer satisfaction (Oliver 1980)	The summary psychological state resulting when the emotion surrounding (dis)confirmed expectations are coupled with the customer’s prior feelings about the consumption experience.

Table 1. Constructs’ Definition

3.2 Hypotheses Development

With respect to expectations as comparative referents, it argued that these expectations influence confirmation paradigm (Szymaski and Henard 2001). In this study, we assumed knowledge

expectation as user's "will" expectation. Unlike pre-purchase behaviour conceptualized in marketing concept (e.g. Oliver 1997), we argued that under e-health service, users have developed positive "will" expectations prior to information access (McKinney, 2002). To support this hypothesis, we adopted motivation theory (expectancy-value theory) (Wigfield 1994) and cognitive consistency theory (Lord and Maher 1991). First, according to basic motivation theory, motivation may be rooted in the basic of need to minimize physical pain and maximize pleasure (Seligman 1990), and expectancy-value theory suggested that individual expectancies for success and the value they have to achieve it are important determinants of their motivation to perform different achievement tasks (Wigfield 1994). In this case, their positive expectations influence achievement or performance behaviour (Wigfield 1994). Second, from cognitive consistency perspective, the desire of actors to maintain cognitive consistency should affect how they interpret any perceived failures in their counterpart's performance (Adobor 2005). According to Lord and Maher (1991), because actors are more likely to maintain cognitive consistency, those who report high initial expectations will use this as a basis for interpreting the behaviour of their counterpart, including the extent to which they determine their expectations are met. Similarly, Joyce and Piper (1998) indicated that patient expectancy variables are strong predictors of therapy outcomes. Following these prior literatures, we also hypothesized that higher knowledge expectations will lead to higher knowledge confirmation (met expectation).

H1: Knowledge expectations are positively associated with knowledge confirmation

According to ECT, perceived performance is defined as customers' perception of how product performance fulfils their needs, wants, and desires (McKinney et al. 2002). Positive confirmation arises when the perceived performance exceed one' expectation. In other words, in the assumption of perfect market (Teas 1993), the higher an individual's perceptions of a product or service's performance, the more likely that perceived performance can exceed expectation levels, resulting in a positive relationship between perceived performance and confirmation (Patterson et al. 1997). In the study of Chiu et al. (2005), they also found that perceived quality is the main predictor of quality confirmation. In this study, we defined three aspects of information performance need to be considered to evaluate the knowledge-intensive website: (1) information quality; (2) information presentation; and (3) website attractiveness.

Information on the quality of health care is crucial for patients to make informed decisions, and the availability of this information will further empower patients in their relationship with physicians (Altinkemer et al. 2006). DeLone and McLean (2003) suggested that information quality can be measured in term of accuracy, ease of understanding, completeness, relevance, and whether it was up to date. In this study, we measured information quality in four dimensions: accuracy, completeness, currency, and format (Nelson et al. 2005). Accuracy refers to the degree to which information is correct, unambiguous, meaningful, believable, and consistent; completeness is the degree to which all possible states relevant to the user population are represented in the stored information; currency represents the degree to which information is up-to-date; and format refers to the degree to which information is presented in a manner that is understandable and interpretable to the user (Nelson et al. 2005).

Bliernel and Hassanein (2007) investigated the customers' use of the internet to locate and evaluate health-related information for self-learning, and the result indicated that content quality and technical adequacy played a significant role. Gallant et al. (2007) investigated the desire content and functionality from patient-consumers perspective on a hospital website and suggested that website attributes such as visual elements, well-organized personalized information, quality information and reputation, and user-centric design are the important factors to develop e-healthcare website. In order to provide a positive user experience, usable technology, the presentation and design of information should be considered as critical factors of website design (Gallant et al. 2007; Jiang and Benbasat 2007; Szymanski and Hise 2000). Jiang and Benbasat (2007) examined the effects of various online product presentation formats on consumers' product understanding by specifying two indicator of product understanding performance: consumers' actual product knowledge and perceived website diagnosticity. The results of this study suggested that the lack of internet interface to present detailed

product information likely leads to customers being less knowledgeable and less informed in making their decision. Thus, we hypothesized these following hypotheses:

H2: Information quality is positively associated with knowledge confirmation

H3: Information presentation is positively associated with knowledge confirmation

H4: Website attractiveness is positively associated with knowledge confirmation

According to TAM theory (Davis et al. 1989), perceived usefulness and perceived ease of use are the predictors of IS acceptance behaviours. Liao et al. (2007) argued that confirmation during actual use will affect post-consumption expectation such as perceived usefulness. By adopting the concept of cognitive dissonance theory, Bhattacharjee (2001) pointed out that users may experience cognitive dissonance or psychological tension if their pre-acceptance usefulness perceptions are disconfirmed during actual use. Rational users may try to remedy this dissonance by distorting or modifying their usefulness perceptions in order to be more consistent with reality. Thus, confirmation will tend to elevate user's perceived usefulness and (dis)confirmation will reduce the initial perception. Moreover, Jiang and Benbesat (2007) posited that the actual knowledge gained by users will positively influence perceived usefulness of the website. Following this literature, we hypothesized:

H5: Knowledge confirmation is positively associated with perceived usefulness

The direct relationship between expectation and customer satisfaction has been proposed by prior researchers (e.g. Oliver 1980). According to Bhattacharjee (2001), the direct relationship between expectation and satisfaction can be explained by adaptation level theory, which posits that human beings perceive stimuli relative to or as a deviation from an adapted level or baseline stimulus level, where this adapted level is determined by the nature of the stimulus, psychological characteristics of the individual experiencing that stimulus, and situational context. The higher expectation is, the higher one's satisfaction toward the service or product and reversely. Thus, we hypothesized:

H6: Knowledge expectations have a positive effect on end-user satisfaction

Confirmation is positively associated with satisfaction as it implies realization of the expected benefits of IS use, while disconfirmation (to the extent where perceived performance lagging expectations) indicates failure to achieve expectations (Bhattacharjee, 2001). Through the content analysis, Lewis (1999) suggested that the use of technology may improve patients' knowledge, involve them in health care decisions, and in turn, lead to better health outcomes. She also posits that the key concern is how to understand the way patient processes the information and translates it into action. If we can evaluate the best way to deliver the message or information, we will better understand how to use technology to optimize its advantage as a health care learning resource. Major empirical findings also support a positive relationship between expectations and satisfaction (e.g. Khalifa and Liu, 2003).

H7: Knowledge confirmation is positively associated with end-user satisfaction

Perceived usefulness is the main reason why people decide to use and accept new information system (Gallant et al., 2007). Determining the elements of the online health information retrieval experience and incorporating those elements in websites that are deemed to contain high quality information from a medical expert's perspective may lead to customer satisfaction (Bliemel and Hassanein, 2007). The relationship between perceived usefulness and consumer satisfaction has also been shown by previous studies (e.g. Bhattacharjee, 2001). Thus, we proposed:

H8: Perceived usefulness has a positive effect on end-user satisfaction

4 RESEARCH METHODOLOGY

4.1 Measurement of variables

As far as possible, items used to measure each construct were based on pre-existing instruments and some of them were modified specifically for this study. Information quality items were adopted from

Nelson et al. (2005); and we modified items developed by Rai et al. (2002) and Zhang and von Dran (2000) to measure information presentation and the items for website attractiveness were adapted from Montoya-Weiss et al. (2003) and Zhang and von Dran (2002). Items for expectations were based on Khalifa and Liu (2003), however in this study, the users were asked to recall the time when they first accessed on the website. Moreover, questions for confirmation and end-user satisfaction were adopted from Bhattacharjee (2001), while questions for perceived usefulness were modified from Davis (1989) by asking the respondents to evaluate four forms of information (e-learning, e-book, PowerPoint and multimedia, and testimonial and Q&A format). This research instrument (questionnaire) was checked by academic professors from IS department and pre-test was conducted to ensure the item measures were well communicated and understood.

4.2 Sample and research procedure

The research uses Website Satisfaction Survey, conducted in 2009 by Korea National Cancer Center. The survey applies a national probability sampling methodology to assess Korea residents' perceptions regarding cancer information and other issues delivered by National Cancer Center via internet channel. The survey was administered directly by NCC itself. NCC data were collected by telephone interviews (in Korean language) and online questionnaires. Data were collected from September 2009 to January 2010. NCC internal databases were used to develop a nationally representative sample of users. Cash rewards were also provided for the participated respondents. Upon the completion of this survey, 200 responses were collected. In the present study, we excluded data from elementary school education level as our t-test suggested that there was a significant different perception between this group with the rest of other groups, resulting in a study sample of 198 usable responses.

Out of 198 usable respondents, 71.21% are female. The majority of respondents' age are in their 20s (50.51%), followed by 30s (26.26%). More than fifty percent of respondents have university degree (67.68%). Among the participants, 47.37% got the information about cancer information from internet, 19.70% from television, 8.59% from family, 8.08% from medical center and the remaining 16.26% got the information from friends, book, cancer club, newsletter, hospital instruction, and other resources. The percentage of respondents knowing the NCC website from word of mouth and internet searching are 44.44 and 40.91 respectively, while others knew the website from various sources (e.g. brochure, newsletter, advertisement, recommendation). Furthermore, among the respondents, approximately 59.60% are general people, followed by 22.22% patient's family/relatives, 14.14% researchers/academia, and only 4.04% are patients. Lastly, we also asked the respondents to indicate their information usage attributes. More than 70% of respondents used the information as resource or reference material, while 26.26% and 17.17% used it as self-learning and to educate cancer patient respectively.

5 DATA ANALYSIS AND RESULT

5.1 Reliability and Validity

Prior to data analysis, the research instrument was assessed for its reliability as well as construct validity. Construct validity was performed through confirmatory factor analysis (CFA) using LISREL 8.7. Firstly, we checked the scale validity by examine the goodness of fit of the overall CFA model using criteria suggested by Choudhury and Karahanna (2008), where ratio of chi-square to degree of freedom should not exceed 5; NFI, CFI, and GFI should be greater than 0.90; AGFI should exceed 0.80; and RMSEA should not exceed 0.80. In the current CFA model, all the fit indexes ($\chi^2=377.04$; $df=249$; $\chi^2/df=1.51$; RMSEA=0.051; NFI=0.91; NNFI=0.96; CFI=0.97; GFI=0.90; AGFI=0.83) suggested an adequate model fit for the empirical data. Furthermore, convergent validity was evaluated using three criteria suggested by Fornell and Larcker (1981): (1) all indicator factor loadings should be greater than 0.7; (2) construct reliabilities (CR) should be greater than 0.80, and (3) average variance extracted (AVE) should exceed 0.50. All factor loadings exceeded 0.7

(significant at $p < 0.001$). CR ranged between 0.84 to 0.93, and AVE ranged from 0.63 to 0.86. Therefore, all three conditions for convergent validity were met. Lastly, discriminant validity was assessed using criteria recommended by Fornell and Larcker (1981), where the square root of AVE should be larger than the correlation scores among constructs. The result indicated that the discriminant validity was also met. We tested the possibility of common method bias by adopting Harman method bias (Podsakoff et al. 2003). Single factor explained for 40.31% of variance, indicating that method bias is not a serious problem in this study. Regarding concern of multicollinearity, the VIF scores ranged from 5.57 to 2.30, below the common VIF threshold of 10, indicating all items were subjected to further analysis (Gable et al. 2008). Lastly, nonresponse bias was measured by verifying that the early and late respondents were not significantly different (Armstrong et al. 1977).

5.2 Structural Model and Hypotheses Testing

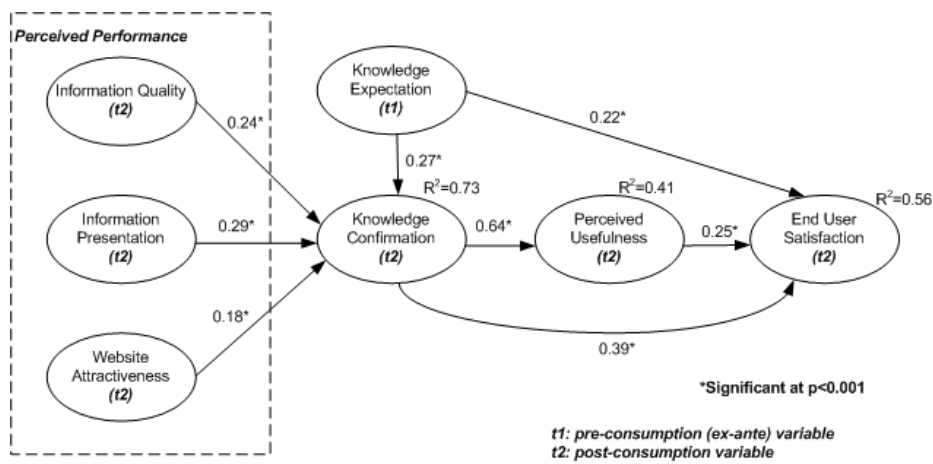


Figure 2. Hypotheses Results

The structural equation model was used to test the eight hypotheses proposed in this study. All fit indexes have suggested adequate model fit between the proposed model and the actual data ($X^2=440.90$; $df=256$, $X^2/df=1.72$; $RMSEA=0.061$; $NFI=0.90$; $NNFI=0.94$; $CFI=0.95$; $GFI=0.90$; $AGFI=0.81$). The findings support all our hypotheses. The model explains 73% of the variance in knowledge confirmation, 41% of the variance in perceived usefulness, and 56% of variance in end-user satisfaction.

6 DISCUSSION AND LIMITATIONS

Firstly, our empirical research indicated that prior-expected knowledge (knowledge expectations) is positively associated with actual knowledge confirmed by users after accessing the e-healthcare website (met expectations). Unlike the traditional ECT in marketing research, our finding confirmed that higher pre-knowledge expectations may lead to higher post-knowledge confirmation. We argued that users or patients' expectations motivate them to access the website, with the assumption that they will gain more knowledge. This finding also supports Joyce and Piper's (1998) study, indicating that their initial expectation is a strong predictor of learning outcomes.

Secondly, this study also found that information quality, information presentation and website attractiveness also influenced the actual knowledge confirmation. Additionally, from our survey, online searching for cancer information is the most popular choice to get information compared with other conventional alternatives. Grounded on this finding, we argued that computer-based information has been an effective strategy for knowledge transfer in healthcare context (Lewis 1999). Moreover, it indicated that as potential patients, website users want to get functional, interactive, and efficiency information, that is, knowledge-intensive website might be the key to enhance the likelihood of people using the healthcare website (Nguyen et al. 2004). The website attributes of information

presentation and attractiveness is also needed to stimulate the learning effectiveness, thus, increase the actual knowledge confirmation (Jiang and Benbesat 2007).

Thirdly, the findings confirmed the positive relationship between knowledge confirmation and perceived usefulness (post-expectations variable), suggesting that users' perception toward the usefulness of information provided by e-healthcare website may be influenced by their confirmation level. Considering the fact that this confirmation level was influenced by information performance, we argued that when expectations and performance are both measured in the post-consumption stage, the post-expectations are related to information performance (Oliver and Burke 1999). Furthermore, we indicated that the usefulness of website is also be supported by a better design of website to meet user needs (Gallant et al. 2007).

Forth, the effects of knowledge expectations, knowledge confirmation, and perceived usefulness on end-user satisfaction were also statistically significant. Through these findings, we posit that user satisfaction is determined by expectations of the knowledge and confirmation of expectations following actual use represented by perceived usefulness (Bhattacharjee 2001). Users form this expectations distribution based on their cumulative expectations through post-confirmation, influencing their further perception. To this extent, however, confirmation also showed a greater effect than both (pre- and post-) expectations constructs, confirming study by Bhattacharjee (2001); Oliver (1993); and Szymanski and Henard (2001). The results also suggested that confirmation may influence satisfaction directly or through the mediation of perceived usefulness, indicating that the relationship between confirmation and satisfaction level can be modelled in two different ways: direct and mediation effect.

Beyond its contribution, this study also has limitations. Firstly, we only investigated the predictor side of the satisfaction. Further research is needed to study the outcome side of the satisfaction model (e.g. satisfaction – intention to use; satisfaction – negative word of mouth). Second, we collected the data of pre-expectation by asking the respondents to recall the time when they first accessed on the website. Even though a range of statistical methods has been conducted to ensure the validity and reliability of our data, further research is needed to measure the expectations and confirmation at two different stages: at adoption and post- adoption. Third, this study is based in Korea, and used only one specific cancer website. Future research can explore the importance of information and knowledge for different respondents in different country. Lastly, even though the multicollinearity was not a problem in this study, further research may validate the results by collecting data from multiple sources.

7 IMPLICATIONS AND FUTURE RESEARCH

This study provides implications for both research and practice. Theoretical implications of this research are threefold: (1) identification of “knowledge-intensive website” attributes; (2) enhancement of the theoretical foundation of e-healthcare from IS perspective by adopting ECT; (3) examination of the importance of information and knowledge and explanation of their impact. First, the raise of concerns about valid information of information source on the internet has been a challenge for e-healthcare centers to provide knowledgeable information, presented in a well format, and posted on an interactive website. Our study also suggests that an intensive website should be able to influence cognitive skills of users in learning and absorbing knowledge. Further research may address this initial finding to study how the website attributes presented in this study together with other attributes (e.g. service quality) influence consumers attitude in different sense.

Secondly, this study has enhanced the concept of electronic healthcare from IS perspective by providing theoretical explanation through the adoption of ECT. By demonstrating that pre-knowledge expectations and perceived information performance influence the actual knowledge acquisition, it indicates that when patients and or users enter a healthcare website, they have built a certain level of expectations, that is, by accessing and turning on the website, they may improve and gain some new information and knowledge, while explicitly, this process is also influenced by perceived performance. We also argued that during the consumption process, the users' expectations might be adjusted by confirmation, resulted in greater or lower post-expectations beliefs (perceived usefulness). Thus, our

study suggests the importance linkage of these variables for e-healthcare satisfaction literature. We also measured the pre-expectations with “will expectations” and the confirmation results showed “met expectations” condition. However, by considering the ambiguity of original “expectations” concept, future research should examine this theory in great depth.

Thirdly, this study examined the online information performance construct by studying its effects on influencing knowledge cognition process. Recognizing that by transferring this knowledge to patients or end-users may help them to participate in decision making process toward their ailments (Ho et al. 2004), further research is needed to examine the roles of other information media, such as mobile information service. With regard to cancer literacy, it is argued that limited health literacy is associated with reduced understanding of cancer screening and awareness, higher rates of cancer incidence, mortality, and lower quality of life and influences the people’s attitudes towards cancer screening (Friedman et al. 2006). Thus, it is a challenge for IS researchers to involve actively in this area, particularly examine how to deliver health information in various electronic format.

Practically, our empirical results indicated that information performance is a core requirement for knowledge-building. Through this study, we argued that having accurate, high quality cancer or general healthcare information can provide individuals with knowledge and assess the consumers to absorb more useful materials. Furthermore, this research suggests that information on e-healthcare website should be presented attractively. Online healthcare can also provide an opportunity to healthcare centers how to provide online information innovatively to attract more patients or internet users. The information presentation in various forms (e.g. multimedia/power point, e-book) can utilize multiple sensory channels to convey information to users, in turn, builds respective mental representations in both verbal and non-verbal system (Jiang and Benbesat 2007). Thus, e-healthcare providers should consider these attributes to build their knowledge-intensive website. Another implication is related to consumer satisfaction. Customer satisfaction is the post-consumption phenomenon, reflecting how much the customer likes or dislikes the service after using it (Churchill and Surprenant 1982). Our study pointed out that confirmation has a greater effect on satisfaction than other variables. Thus, it is not sufficient for a healthcare center to just improve its quality information attributes; it must also try to reduce the risk as an effort to increase patients or users’ expectations, which in turn, increase their actual confirmation.

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