Analysis of the Factors Affecting Consumer Acceptance of Accredited Online Health Information

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With the increasing use of the internet and the spread of smartphones, health information seekers obtain considerable information through the internet. As the amount of online health information increases, the need for quality management of health information has been emphasized. The purpose of this study was to investigate the factors affecting the intention of using accredited online health information by applying the extended technology acceptance model (Extended-TAM). An online survey was conducted from September 15, 2016 to October 3, 2016, on 500 men and women aged 19–69 years. The results showed that the greatest factor influencing the acceptance of the accredited health information was perceived usefulness, and the expectation for the quality of the accreditation system was the most important mediator variable. In order to establish the health information accreditation system as a means to provide easy and useful information to the consumers, it is necessary to carry out quality management and promote the system through the continuous monitoring of the accreditation system.

Keywords: Health Information; Accreditation; Internet Use; Technology Acceptance Model; Quality

INTRODUCTION

Health information is gaining importance as a key resource for self-care during a chronic illness. Due to the increasing use of the internet and the spread of smartphones, health information seekers obtain substantial information through the internet (1,2). As a result, the number of websites for health information is increasing, but there is also a concern about the negative effects due to considerable commercial information and the lack of credibility and scientific content (3). Therefore, there is a need to manage the quality of health information so that consumers of online health information can conveniently use scientifically verified information (4-6).

The accreditation system of health information provides verified information to protect consumers from harm caused due to distorted information. There are international accreditation systems such as the health on the net (HON) in Switzerland, MedPICS Certification and Rating of Trustful and Assessed Health Information on the Net (MedCERTAIN) in Europe, the Organizing Medical Networked Information (OMNI) in the UK, and the Health Improvement Institute (HII) in the USA (7). In Korea, the Korean Academy of Medical Sciences has been operating accreditation programs since 2006, but the activities of the developers are low due to lack of motivation to be accredited, and consumers' awareness about accreditation is not high.

In order to diffuse the health information accreditation system, the aspect of demand is important to evaluate consumers' level of accredited health information use. Therefore, it is necessary to identify the factors affecting acceptance and the acceptance of an information accreditation system and to design an accreditation system considering these factors.

In this study, the technology acceptance model (TAM) was used to identify the influencing factors related to consumers' use of accredited online health information. The TAM was developed by Davis (8) to predict consumers' acceptance of information technology and explained that perceived usefulness and perceived ease of use were the major factors affecting the acceptance of the technology. Venkatesh and Davis (9) suggested the extended TAM (Extended-TAM), which was an extended model constructed by adding external variables such as social influencing variables and cognitive instrumental variables to the TAM, and therefore comprehensive explanation was possible.

In a previous study that examined the factors related to technology acceptance in the field of health care based on the Extended-TAM, there were Gefen et al. (10), Shih (11), and Song (12). Among them, we have focused on the study of Song (12), who identified acceptance factors of health information websites by applying the Extended-TAM, wherein it was suggested that the social norm and quality of health information are the main factors of online health information use. Especially, the

quality of information directly influences perceived playfulness, usefulness, and ease of use, as well as website loyalty as a key factor.

However, it is difficult for consumers to evaluate the quality of health information directly. The health information accreditation system evaluates as the agent the activity that the consumer should evaluate the quality by itself. Therefore, the system quality factor of the accreditation system that assesses the information on behalf of the consumers is considered to have a significant influence on the acceptance of the information.

In addition to health information, the quality factors of the system for other internet services have been suggested as important factors affecting the decision of use. Shih (11) found that perceived system quality in online shopping research through the Internet affects decision making for online shopping service acceptance.

As a factor affecting the satisfaction and intention of smartphone use, Cho (13) has suggested that the relevance of the system and service quality is included in the model as well as information quality.

In this regard, our study aimed to identify the factors influencing the intention to use accredited online health information based on the Extended-TAM with the mediator variable 'expectations for the quality of accreditation system' along with the perceived usefulness and ease of use presented in the existing TAM.

MATERIALS AND METHODS

Research model
The research model proposed in this study is the evaluation model for predicting acceptance factors for accredited online health information based on the TAM (8), TAM2 (9), and Porter and Donthe (14), Gefen et al. (10) to apply the Extended-TAM (Fig. 1).

Questionnaire design
The survey items were modified and supplemented according to the research hypothesis by referring to the measurement tools used in the TAM, TAM2, and the Extended-TAM. The research items used in the study were demographic variables (gender, age, etc.), independent variables (importance of reliability, barriers, health consciousness, etc.), TAM variables (perceived usefulness, perceived ease of use, etc.), and the dependent variable (intention of use).

Importance of health information reliability: the degree to which consumers' think about the reliability that health information should have.

Barriers to accessing accredited health information: the degree to which consumers' perceive the problems that may arise through the health information accreditation system.

Health consciousness: the degree to which consumers are interested in health promotion and disease prevention by themselves.
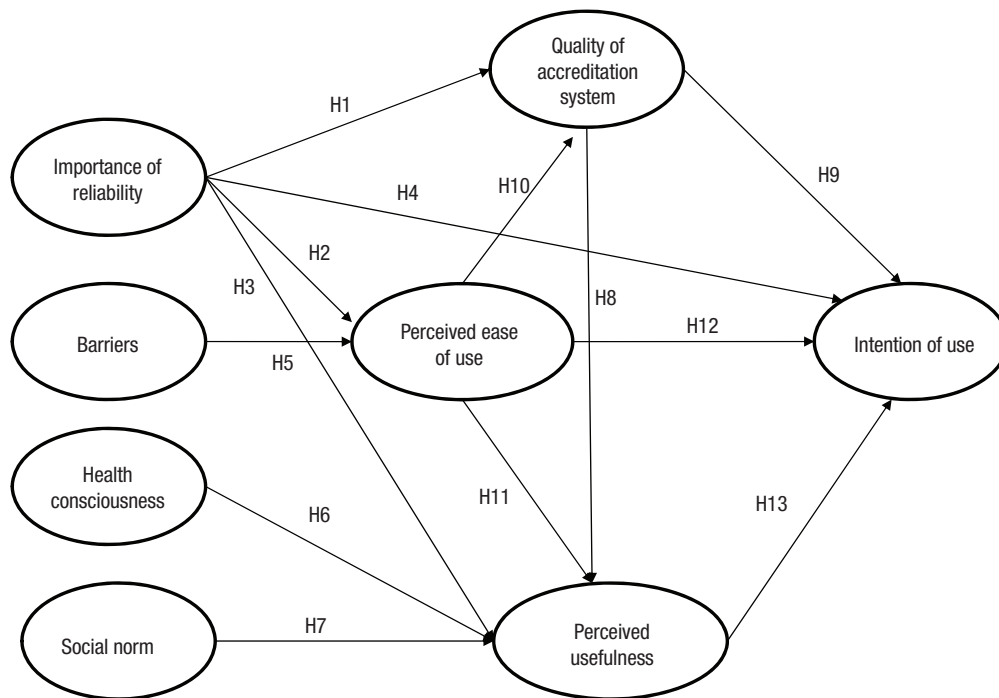

Fig. 1. Research model for predicting acceptance factors for accredited online health information based on the TAM.
TAM = technology acceptance model.

Social norm for accredited health information: consumers' awareness regarding whether they think they should use accredited health information is important to others.

Perceived usefulness of accredited health information: the degree to which consumers' believe that they can benefit from using accredited online health information.

Perceived ease of use of accredited health information: the degree to which consumers' believe that they can easily use accredited online health information.

Expectation for the quality of accreditation system: the degree to which consumers' trust the health information accreditation system.

Intention of use of accredited health information: the degree to which consumers want to use accredited internet health information.

Research hypotheses

Based on the concept of the previous research on the variables presented in this research model, the research hypotheses were as follows.

H1: the importance of reliability will have a positive impact on the expectation for the quality of accreditation system.

H2: the importance of reliability will have a positive impact on the perceived ease of use.

H3: the importance of reliability will have a positive impact on the perceived usefulness.

H4: the importance of reliability will have a positive impact on the intention of use.

H5: barriers will have a negative impact on the perceived ease of use.

H6: health consciousness will have a positive impact on perceived usefulness.

H7: social norm will have a positive impact on perceived usefulness.

H8: the expectation for the quality of accreditation system will have a positive impact on perceived usefulness.

H9: the expectation for the quality of accreditation system will have a positive effect on the intention of use.

H10: perceived ease of use will have a positive impact on the expectation for the quality of accreditation system.

H11: perceived ease of use will have a positive impact on perceived usefulness.

H12: perceived ease of use will have a positive impact on the intention of use.

H13: the perceived usefulness of accredited health information will have a positive impact on the intention of use of the accredited online health information.

Participants

The surveys for this study were conducted from September 15, 2016 to October 3, 2016. The subjects of the survey were 500 persons who were aged 19–69 years, and an online survey was conducted using structured questionnaire. Incomplete responses were excluded. As of August 2016, the sample was categorized by gender and age based on the national population distribution of the resident population of the ministry of government administration and home affairs. The sampling error was ± 4.38% with 95% confidence interval.

Data analysis

Frequency analysis was conducted to investigate the demographic characteristics of the questionnaire items. In order to identify the factors related to acceptance of the online health information accreditation by applying the TAM, the importance of the reliability of health information, barriers, health consciousness, and social norm were considered the independent variables; perceived usefulness and perceived ease of use, expectation for the quality of accreditation system were considered the mediators. The intention of using the accredited online health information was the dependent variable. Based on these variables, we used analysis of the structural equation model (SEM), and data were analyzed using SPSS 24.0 (SPSS Inc., Chicago, IL, USA) and AMOS 24.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Demographic characteristics

The demographic characteristics of the respondents are shown in Table 1. Males were 51.0%, and females were 49.0%, and the gender proportion was similar. The greatest percentage of participants were in their 40s (24.0%). Regarding participants' education, most of them had graduated from college, followed by high school. The subjective health status was 66.4% for those who responded that their health condition was good or very good.

Table 1. The demographic characteristics of the respondents

Category		Frequency
Gender	Male	255 (51.0)
	Female	245 (49.0)
Age	19–29	91 (18.2)
	30–39	103 (20.6)
	40–49	120 (24.0)
	50–59	114 (22.8)
	60–69	72 (14.4)
Education	Middle school or below	10 (2.0)
	High school	95 (19.0)
	College in school	39 (7.8)
	College graduate	298 (59.6)
	Graduate school or above	58 (11.6)
Subjective health status	Very bad	4 (0.8)
	Bad	164 (32.8)
	Good	315 (63.0)
	Very good	17 (3.4)

Data are presented as number of persons (%).

Assessment of measurement tools

Reliability analysis

The results of the reliability analysis of the TAM showed that the internal consistency reliability was 0.7 or higher for all variables except 'barriers'. The expectation for the quality of accreditation system had the highest internal consistency reliability of 0.863.

Validity analysis

In this study, the validity was verified using the confirmatory factor analysis (CFA), and the convergent validity was measured. Convergent validity can be considered appropriate when the standardized coefficient (SC) is 0.5 or more, the average variance extracted (AVE) value is 0.5 or more, and the value of the construct reliability (CR) is 0.7 or more (15-17). The result of the validity analysis showed that the SC was 0.5 or more, the AVE was 0.5 or more, and the CR 0.7 or more for the independent variables, the mediator variables, and the dependent variable. Therefore, the validity of the measurement factors could be considered high (Table 2).

Model's goodness-of-fit

The Model's goodness-of-fit was evaluated and the results are shown in Table 3. There is that χ^2 = 1,098.830, Q = 2.308, goodness-of-fit index (GFI) = 0.879, root-mean-square error of approximation (RMSEA) = 0.051, comparative fit index (CFI) = 0.917, and Tucker-Lewis index (TLI) = 0.908, and the score was

Table 2. CFA result

Category		Mean	Standard deviation	Non-SC	Standard error	Critical ratio	SC	AVE	CR
Importance of reliability	Provide good service	3.11	0.54	1.000	-	-	0.773	0.726	0.929
	Privacy protect	2.80	0.74	1.025	0.08	12.717	0.575		
	Reliable	3.10	0.59	1.047	0.06	17.042	0.747		
	Consumer care	3.02	0.59	1.043	0.06	16.928	0.743		
	Honesty	2.94	0.64	1.120	0.07	16.764	0.737		
Barriers	Limited information	2.87	0.58	1.000	-	-	0.636	0.625	0.832
	Bad information	3.02	0.55	0.917	0.12	7.636	0.619		
	Inconvenient	2.74	0.59	0.826	0.11	7.395	0.523		
Health consciousness	Health maintenance efforts	2.68	0.72	1.000	-	-	0.646	0.658	0.905
	Disease prevention	2.97	0.71	1.095	0.09	12.473	0.716		
	Self care	3.35	0.58	0.860	0.07	12.175	0.691		
	Healthy diet	3.30	0.59	0.879	0.07	12.176	0.691		
	Healthy life	3.57	0.55	0.610	0.06	9.626	0.514		
Social norm	My physician	3.04	0.60	1.000	-	-	0.778	0.820	0.932
	My family	3.04	0.58	0.981	0.06	17.765	0.795		
	Important others	2.92	0.58	0.959	0.06	17.106	0.767		
Expectation for the quality of accreditation system	Certainty/uncertainty	3.37	0.61	1.000	-	-	0.739	0.735	0.951
	Unbiased information	3.45	0.59	0.899	0.06	14.572	0.683		
	Health information updated date	3.37	0.57	0.895	0.06	14.975	0.701		
	Clear source	3.51	0.57	0.900	0.06	15.066	0.705		
	Easy to understand	3.46	0.57	0.799	0.06	13.289	0.624		
	Accurate contents	3.45	0.55	0.811	0.06	14.133	0.663		
	Clear goals	3.29	0.54	0.843	0.06	14.943	0.700		
Perceived ease of use	Easy to differentiate	3.26	0.56	1.000	-	-	0.693	0.812	0.928
	Easy to learn	3.16	0.55	1.139	0.07	15.751	0.798		
	Easy to find	3.10	0.55	1.082	0.07	15.229	0.766		
Perceived usefulness	Good to decision making	3.25	0.56	1.000	-	-	0.750	0.763	0.928
	Save cost	3.17	0.63	1.018	0.07	14.985	0.676		
	Save time	3.18	0.61	1.048	0.07	16.168	0.725		
	Good to health	3.21	0.48	0.817	0.05	15.887	0.713		
Intention of use	Recommend to others	3.16	0.59	1.000	-	-	0.751	0.791	0.919
	Revisit to site	3.23	0.54	0.903	0.06	16.353	0.748		
	Use if necessary	3.07	0.59	0.983	0.06	16.076	0.736		

CFA = confirmatory factor analysis, SC = standardized coefficient, AVE = average variance extracted, CR = construct reliability.

Table 3. Model's goodness-of-fit

Model	χ^2	df	Q (χ^2/df)	GFI	RMSEA	CFI	TLI
Research model	1,098.830	476	2.308	0.879	0.051	0.917	0.908

GFI = goodness-of-fit index, RMSEA = root-mean-square error of approximation, CFI = comparative fit index, TLI = Tucker-Lewis index.

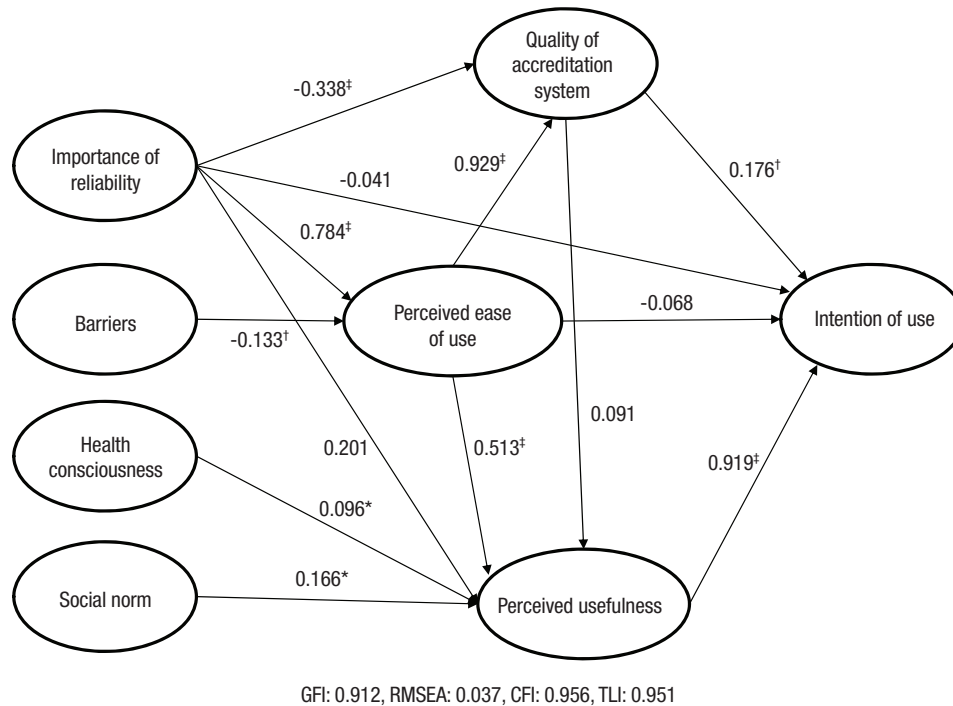GFI: 0.912, RMSEA: 0.037, CFI: 0.956, TLI: 0.951

Fig. 2. Results of research hypotheses based on the SEM.
SEM = structural equation model, GFI = goodness-of-fit index, RMSEA = root-mean-square error of approximation, CFI = comparative fit index, TLI = Tucker-Lewis index.
*$P < 0.05$; †$P < 0.01$; ‡$P < 0.001$.

high and the overall proposed model is appropriate.

Results of research hypotheses

Based on the SEM, the hypothesis acceptance was determined at a significance level of 0.05 and t value of 1.96 (Fig. 2).

First, as the importance of health information reliability was recognized, the subjects showed skepticism about the expectation for the quality of accreditation system (path coefficient, −0.338; $P < 0.001$) and showed optimism about the perceived ease of use of the accredited information (path coefficient, 0.784; $P < 0.001$). However, there was no significant effect on perceived usefulness (path coefficient, 0.201; $P = 0.093$) and intention of use (path coefficient, 0.041; $P = 0.688$).

Second, regarding the barriers to the use of the accredited information, the more the perceived barriers, the more the negative perception of the ease of using the accredited information (path coefficient, −0.133; $P < 0.01$).

Third, health consciousness positively affected the perceived usefulness of accredited information (path coefficient, 0.096; $P < 0.05$).

Fourth, social norm positively affected the perceived usefulness (path coefficient, 0.166; $P < 0.05$).

Fifth, the expectation for the quality of accreditation system positively influenced the intention of use (path coefficient, 0.176; $P < 0.01$).

Sixth, the perceived ease of use of the accredited information

had a very significant positive impact on the expectation for the quality of accreditation system (path coefficient 0.929, $P < 0.001$) and perceived usefulness (path coefficient, 0.513; $P < 0.001$). However, it did not directly affect the intention of use (path coefficient, −0.068; $P = 0.640$).

Seventh, the perceived usefulness was very significantly and positively influenced by the intention of use (path coefficient, 0.919; $P < 0.001$), and the hypothesis was adopted.

DISCUSSION

In this study, we applied the Extended-TAM to identify the factors influencing the intention of using the accredited online health information, and the following results were found.

First, the results of this study showed that the most influential factor in the acceptance of accredited health information was the perceived usefulness of the accredited information. The higher the health consciousness, the higher the perceived usefulness of health information. Noh et al. (18) argued that the more one was interested in health, the higher the perceived usefulness and ease of online health information. Furthermore, Choi et al. (19) suggested that the higher the individual's interest in health, the more the perceived usefulness of the TV health programs. Therefore, health consciousness is an important factor in health information utilization.

Second, this study sought to confirm the effect adding the

mediator variables 'expectation for the quality of accreditation system for health information' into the existing TAM. The results confirmed that the expectation for the quality of accreditation system is a very important mediator in the use of online health information. Therefore, quality control of the accreditation system is important to the consumers to accept the accredited health information well. In other words, it is necessary to design the accreditation system as a system that can select qualified health information. Deng et al. (20) analyzed the factors influencing the intention of accessing health information using mobile phones among Chinese people. It was found that the quality of health information, perceived value, and trust affected the intention of using health information. Liu et al. (21) studied the factors affecting the use of internet health information. They also found that perceived trust had an effect on the intention of use.

On the other hand, in this study's analysis, it is necessary to pay attention to the finding that the higher the perceived importance of health information reliability, the higher the skepticism about the expectation for the quality of accreditation system. Since the recognition of the quality of accreditation system was evaluated when the health information accreditation system has not yet been implemented, it is interpreted that the higher the perceived reliability of the health information, the more the concern about the quality of the health information accreditation system. Therefore, it is important to include the items that can evaluate the health information reliability based on the health information accreditation criteria.

Third, the perceived ease of use did not have a direct effect on the intention of use but had an effect on the expectation for the quality of accreditation system and the perceived usefulness. The perceived ease of use affected perceived usefulness, which is similar to the results of the previous TAM studies. The perceived ease of use of health information had an indirect effect on the intention of use, which is different from the existing TAM hypothesis but is consistent with the results of Chau (22), Song (12), and some other studies. This confirms that it is difficult to expect that the easy to understand accredited health information could be used as health information. Since it is not difficult for consumers to understand health information, they evaluate the usefulness of the health information, and the higher the usefulness of health information, the higher the intention of using accredited health information. In addition, the perceived ease of using accredited health information had a significant effect on the expectation for the quality of accreditation system. The finding that the ease of using health information positively affects the reliability of the quality of information is consistent with the findings of Gefen et al.'s study (10).

On the other hand, the higher the perceived barriers to the use of certified health information, the lower the acceptance of certified health information. The barriers include insufficient accredited information leading to a lack of available information and the inconvenience of verifying whether the information is accredited. When designing the accreditation system, these barriers should be reduced as much as possible so that consumers can appreciate the usefulness of the accreditation system.

However, despite these important findings, there are limitations to this study. First, based on the TAM theory and the predictive direction of the previous studies, this study constructed a model; however, since this study used cross-sectional data, there is a limitation of cause and effect between variables. Another limitation is the representativeness of the survey subjects. This study method was an online survey, which considered the gender and age of the sample distribution in the subject extraction. However, it has been pointed out that the study subjects were limited to those who already use the Internet.

Quality control through continuous monitoring of the accreditation system is very important for the health information accreditation system to become the means to provide easy and useful information to the consumers. Further, efforts to distribute the accreditation system should be made. Consumers' interest in health should be improved by educating and publicizing the negative effects of distorted health information and emphasizing the importance of using accredited health information. In addition, it is necessary to establish a strategy for enhancing the social norm. If the healthcare provider provides accredited health information during counseling or medical treatment, it is suggested that the effective distribution of accredited health information is possible in the case of applying for the insurance.

DISCLOSURE

The authors have no potential conflicts of interest to disclose.

AUTHOR CONTRIBUTION

Conceptualization: Jo HS, Song TM, Kim BG. Data curation: Jo HS, Kim BG. Formal analysis: Kim BG. Investigation: Jo HS, Song TM, Kim BG. Writing - original draft: Jo HS, Kim BG. Writing - review & editing: Jo HS, Song TM, Kim BG.

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