

Factors Effecting Consumers' Attitudes toward Using of e-Healthcare

Tippawan Wongkaew¹⁾ Nithinant Thammakoranonta, *Asst.Prof.*²⁾

¹⁾ Graduate school of Management and Innovation, King Mongkut's University of Technology Thonburi, Bangkok, Thailand
(t_wongkaew@hotmail.com)

²⁾ School of Applied Statistics, National Institute of Development Administration Bangkok, Thailand
(nithinan@as.nida.ac.th)

Abstract

The proliferation of hospital-to-consumer, e-Healthcare activities has created a need to understand how and why people participate in e-Healthcare. This study treats consumer e-Healthcare as a technology adoption process and evaluates the suitability of a popular adoption models. This research supports the use of the technology acceptance model (TAM) to predict online activity, attitudes toward using of e-Healthcare. Two minor alterations are made to the traditional use of TAM—perceived ease of use is linked to perceived usefulness, and perceived usefulness is directly linked to actual use. A survey of 180 consumes age between 18 – 50 years old was used.

Keywords: e-Healthcare, Technology acceptance model, Attitudes toward using, Technology adoption

1. Introduction

The advances and convergence of IT and telecommunication are bringing the entire healthcare services to the patient's doorstep (Stead, 1998). Healthcare is experiencing a dramatic transformation in information exchange which is driven by technology (Baker, 2000; Cain et al., 2000; Coile, 1999a, b; 2000a, b). E-healthcare is likely to become a significant part of the future of healthcare. E-healthcare is the use of telecommunications and information technology to provide access to health assessment, diagnosis, intervention, consultation, supervision, education and information across distance. E-health includes the delivery of health services via the internet but also includes telephone, television, video and fax. There is a convergence of functions and hardwares in the telecommunications field. Videoconferencing, for example, can be conducted over the internet using cameras connected to computers, or the data can be sent over telephone lines, or over a closed proprietary intranet (Combs, 2000; Deloitte Research Report, 2002; McLendon, 2000).

With the average income level rising and medical technology developing, the focus of healthcare is shifting from disease treatment to health promotion and preventive medicine. Accordingly, the supplier-centered healthcare system is rapidly turning into a consumer-oriented system. Adapting to such a changing environment, consumers are more inclined to make decisions and take responsibilities for their health on their own. Thus, health information providers tend to focus on e-Healthcare implement to response customer rising needs.

As such, user will be a driver of e-Healthcare success. This study aims to investigate why consumers decide to adopt e-Healthcare. This study will examine the nature of e-healthcare and assess its prospects and potential. Moreover, the study will also seek to bring e-Healthcare into the Thais context and focus on the possible development of e-Healthcare in this country. As the e-Healthcare in Thailand is still very much in early stage to development, I hope that such finding will be constructive to its development and growth. Healthcare sectors venturing into the e-Healthcare may also find this study useful in gaining insights into consumer adoption behavior.

2. Literature Review

2.1 e-Healthcare

E-healthcare is defined as the use of emerging information and communication technology, especially the internet, to improve and enable healthcare. Therefore, the internet is not seen as a source of information only, but also as a means of advancing E-healthcare by means of communication. E-healthcare service systems complement traditional approaches for healthcare delivery. They are mostly used for non-urgent consultations, obtaining routine laboratory test results, ordering repeat prescriptions and making appointments.

In addition, “Towards the Framework of Adaptive User Interfaces for eHealth” by Ekaterina Vasilyeva, Mykola Pechenizkiy and Seppo Puuronen, explained that eHealth is a developing branch of Medical Informatics aimed to significantly contribute to improvement in quality, access and efficacy of health care through: (1) development of an intelligent environment that enables people to manage their well being through access to qualified and trusted sources of health information and active participation in illness prevention; (2) enabling patients to participate, with better knowledge and responsibility, in the processes of care and rehabilitation, through intelligent monitoring systems as well as through relevant and personalized health information; (3) providing health professionals with access to timely relevant information at the point of need, new tools for better management of risk and systems to acquire up to date medical knowledge; (4) ensuring that people worldwide can confidently and with full understanding of known risks realise the potential of the Internet in managing their own health and the health of those in their care; and (5) offering reliable and affordable personal health systems assisting people to manage their lifestyle [2,22].

2.2 Technology Acceptance Models

A number of technology acceptance models such as Roger’s diffusion of innovations model, Kwon and Zmud’s diffusion/implementation model, and Davis’s Technology Acceptance Model (TAM) have been developed (Kwon & Chidambaram, 2000). Of these, the TAM has been the focus of many Information Science researchers and practitioners over the past twenty years and has been used as tool regarding the adoption of Information Systems by organizations and individuals. The premise of the TAM is that users’ attitudes towards new technologies are shaped by two related factors: Perceived Usefulness (PU), and Perceived Ease of Use (PEOU). That is, PU (the degree to which a person believes that using a particular system would enhance their job performance) exerts an influence on users’ PEOU (the degree to which a person believes that using a particular system would be free of effort). This model has been applied in a number of organizational environments and has been a reliable predictor of users’ actual actions, especially among university students and business executives (Chau & Hu, 2001; Kwon & Chidambaram, 2000).

TAM, introduced by Davis, is an adaptation of TRA (Theory of Reasoned Action) model specifically tailored for modeling user acceptance of IS. The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified. TAM adapted the generic TRA model to the particular domain of user acceptance of IS technology, replacing TRA model’s attitudinal determinants with two beliefs: perceived usefulness and perceived ease of use. The TAM was found to be a much simpler, easier to use, and more powerful model of the determinants of user acceptance of IS technology, while both models were found to satisfactorily predict an individual’s intentions and actual behavior. In addition, TAM’s attitudinal determinants outperformed the TRA model’s much larger set of measures.

The TAM is a preferred choice of models as the TAM explains more variance in attitude toward a technology, and a comparable percentage of variance in usage, as the Theory of Planned Behavior (Mathieson, 1991; Taylor and Todd, 1995). Also, the TAM constructs are more amenable to operationalization and empirical testing than are the broad concepts of Rogers’ (1995) diffusion of innovations framework. Overall, TAM relevant to the study of e-Healthcare which is one of communication technology accommodating patients’ need to access the information.

3. Conceptual Framework

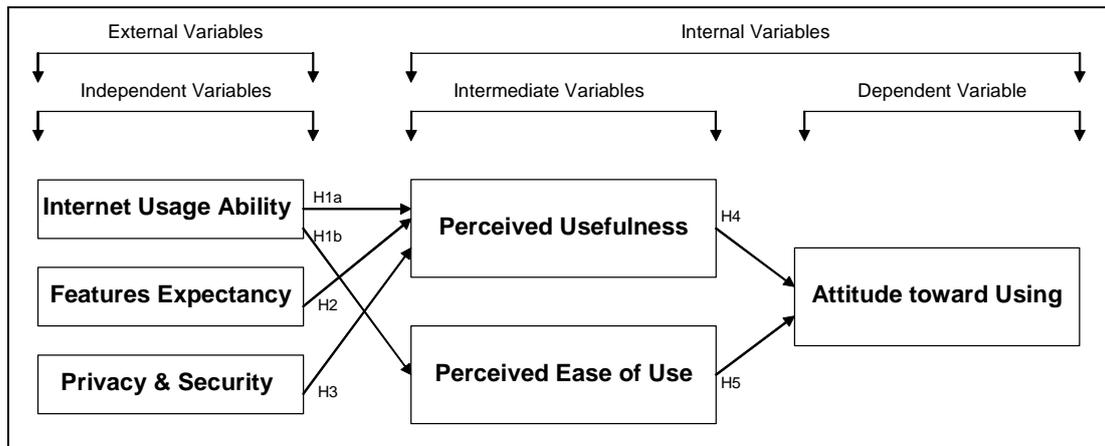


Figure 1 Conceptual Framework

Base on Fig. 1, attitudes toward using is the dependent variable while two motivational variables, “Perceived usefulness and Perceived Ease of Use”, serve as intermediate variables moderation independent and dependent variables. Independent (external) variables are made up of.

On the basis of the components presented in the framework (Fig. 1). Five potential relations are examined: (H1a) IA-PU; (H1b) IA-PEOU; (H2) F-PU; (H3) PS-PU; (H4) PU-AT; (H5) PEOU-AT. In line with previous studies using TAM, it is thus hypothesized that there exist positive and direct relationships between perceived usefulness (PU), perceived-ease-of-use (PEOU), attitude toward using (AT), and internet usage ability, features expectancy and privacy and security. Five hypotheses are generated from these relationships. The rationale for each hypothesis is also discussed in the following section

Davis (1989) finds that a user’s overall attitude toward using a specific information technology and application is a major factor determining whether an individual uses that system. Attitude toward using is also determined by a user’s perceived usefulness (PU) and perceived-ease-of-use (PEOU). O’ Cass and Fenench (2003) also argue that TAM is appropriate for research areas in electronic commerce applications (e.g. Internet retailing) since E-commerce is also based on computer technologies. Van der Heijden (2003) also supports the robustness of TAM to study website usage in a non-US context. As scholars indicated above and e-Healthcare characteristics are similar to electronic commerce we were then adapt this model in our study. Base on the literature review, the following hypotheses are postulated:

- H1a: Internet usage ability (IA) positively influences perceived usefulness of e-Healthcare
- H1b: Internet usage ability (IA) positively influences perceived-ease-of-use of e-Healthcare.
- H2: Features expectancy (F) positively influences perceived usefulness of e-Healthcare.
- H3: Privacy and security (PS) positively influences perceived usefulness of e-Healthcare.
- H4: Perceived usefulness (PU) positively influences attitudes toward using e-Healthcare
- H5: Perceived-ease-of-use (PEOU) positively influences attitudes toward using e-Healthcare

4. Research Methodology

4.1 Method and Instrument

Population, sampling and questionnaire which was developed from “Extending the Technology Acceptance Model to Acceptance for Social Influence: Theoretical Bases and Empirical Validation” by Yogesh Malhotra and Dennis F. Galletta (1999) was used as a tool of data collection and data analysis for the study. Validity testing has been tested in the perspective of accuracy, idea, narrative & tone and message which measure consumers’ attitudes toward using of e-Healthcare in Bangkok by proposed designed questionnaire to the independent study committees whether each question introduces to the study’s objective and then did further edition. Researcher tests questionnaire reliability with bringing to a group of targeted population for testing difficulty of the questionnaire.

4.2 Sampling Method

A nationally representative random sample of adults was contacted through a questionnaire survey with population whose age between 18 and 49 years in Bangkok both male and female because those under the age of 18 or above 49 are deemed to have little experience with using health information websites, and thus not likely to provide reliable responses. This relates to the study of Chang et al (H.J. Chang, D. Kim, J.S. Shim, Attributes of user-centered evaluation for health information websites, J. Korean Soc. Med. Inform. 10 (4) (2004) 429–440 (in Korean)) which found that over 80% of those in their 20 s and 65% of those in their 30 s used the Internet to access health information, while those in their 50 s and above used other media than the Internet to search for health information.

5. Data Collection

340 questionnaires were passed to a group of targeted population who live in Bangkok by hand and via e-mail. It took two months to gather all data. Probability sampling and simple random sampling have been applied to the prospects. Among 213 immediate returned questionnaires, there were 180 screened and qualified respondents distributed proportionally in all groups of age. SPSS was used to enter and analyze the data. In addition to descriptive statistics the analyses included factor analyses and reliability assessment of the scales used in the study and hierarchical regression analyses to examine the relationships between the one dependent variables (AT), two intermediate variables (PEOU, PU) and three external variable (IA, F, PS).

6. Data Analysis

Data used to test the measurement model were gathered from a sample of respondent who live in Bangkok. There were 180 screened and qualified respondents who self-administered the multiple-item questionnaire. The respondents were asked to read the information and scope of e-Healthcare. They were then instructed the questionnaire to answer the questions. For each question, respondents were asked to tick the response which best described their level of agreement.

According to the sample data, 63.9% were female and 36.1% were male, and 66.7% had a bachelor degree. 51.1% were single and 44.4% were married. Respondents ranged from 18 – 50 years of age, 37.2% is 30 – 40, 33.3% is 18 – 29 and 29.4% is 41 – 50 years old. The respondents were spread across 8 occupation categories, including employee in private sector (42.2%), student (8.3%), doctor (5%), government employee or teacher (4.4%), Nurse (3.3%), entrepreneur, (2.8%), housewife (2.8%) and other (31.1%) with most income between 20,001 – 30,000 Baht (35.6%). Most of them use the internet for surfing for information (62%) while there were 91.1% had their own e-mail address.

Table 1 Multiple linear regressions test result for internet usage ability, features expectancy and privacy & security with perceived usefulness

Regression Test	Adjusted R Square	Coefficient	Model Significant	Hypothesis Result
Perceived usefulness	0.323		F = 29.512 (0.01)	H1a Supported
Internet usage ability		*-0.120		H2 Supported
Features expectancy		*0.409		H3 Supported
Privacy & security		*0.229		

* $p < 0.01$

According to Table 1, it presents relationship of Internet usage ability, features expectancy and privacy & security toward perceived usefulness by using multiple linear regression. It was indicated that each variable; internet usage ability, features expectancy and privacy & security, has positive relationship with perceived usefulness. The empirical results from the last model indicate that $F = 29.512$ with confidentiality at 0.01. However, the empirical results from this model can explain variance of perceived usefulness only 32.3 %. There is 67.7 % remaining, so it presents that there will be other factors might affect to the perceived usefulness.

Table 2 Multiple linear regressions test result for internet usage ability, features expectancy and privacy & security with perceived ease of use

Regression Test	Adjusted R Square	Coefficient	Model Significant	Hypothesis Result
Perceived ease of use Internet usage ability Features expectancy Privacy & security Features expectancy X Privacy & security	0.288	*- 0.206 *- 0.396 *- 0.380 * 0.167	F = 19.131 (0.01)	H1b Supported

* $p < 0.01$

According to Table 2, it presented the result of multiple linear regression relationship of Perceived Ease of Use. It indicated that all variables; internet usage ability, features expectancy and privacy & security have negative relationship with perceived ease of use. This is not align with the earlier framework that indicate only internet usage ability will influence perceived ease of use as the empirical results indicate that Privacy & security does not influence perceived ease of use directly. Privacy & security only supports relationship of features expectancy to perceived ease of use. As both Privacy & security and perceived ease of use affect to each other, therefore they should be developed together. This consistent with a comment from open end that there should be log-in feature to access the patient files for his privacy and security. The empirical results from the last model indicate that $F = 19.131$ at confidentiality 0.01. However, the empirical results from this model can explain variance of perceived ease of use only 28.8 %. There is 71.2 % remaining, so it presents that there will be other factors might affect to the perceived ease of use.

Table 3 Multiple linear regressions test result for Perceived usefulness and perceived ease of use with Attitude toward using

Regression Test	Adjusted R Square	Coefficient	Model Significant	Hypothesis Result
Attitude toward using Perceived usefulness Perceived ease of use Perceived usefulness X Perceived ease of use	0.359	*0.288 *0.186 *0.028	F = 34.416 (0.01)	H4 Supported H5 Supported

* $p < 0.01$

According to Table 3, it shows multiple linear regression relationship Perceived Usefulness, Perceived Ease of Use toward Attitude toward Using. It was found that when we consider each variable; perceived usefulness and perceived ease of use have positively influences attitudes toward using. The empirical results from the last model indicate that $F = 34.416$ at confidence level 0.01. There was found positively Interactive between perceived usefulness and perceived ease of use with attitude toward using. Therefore it could be discussed that both perceived usefulness and perceived ease of use positively influences attitudes toward using. However, it is agreed with earlier framework which explains about each perceived usefulness and perceived ease of use is positively influences attitudes toward using individually. On the other hand, the empirical results indicate that Perceived Ease of Use does not influence attitudes toward using directly. Perceived ease of use only supports relationship of Perceived Usefulness to attitude toward using. As both perceived ease of use and perceived Usefulness affect to each other, therefore they should be developed together. This is similar to previous study of Gefen & Straub, 2000; Lederer et al., 2000; Lin & Lu, 2000; Mathieson, 1991; Teo et al., 1999, which indicated that perceived usefulness is the key aspect of adoption; perceived ease of use has only a minor effect. One interpretation is that as systems become easier to use and users become more technologically savvy, the variation in the perceived ease of use dimension is reduced. This argument has been made for Internet adoption (Teo et al., 1999), and this may be particularly true in current e-commerce adoption.

However, the empirical results from this model can explain variance of attitude toward using only 35.9%. There is 64.1% remaining, so it presents that there will be other factors might affect to the Attitude toward Using.

Besides, both perceived ease of use and Perceived Usefulness might affect attitude toward using, but this is supported from respondents in Bangkok only. Other sample from different areas or nation might show difference result.

7. Conclusion Discussion and Recommendation

7.1 Conclusion and Discussion

From the analysis of multiple linear regressions, the result did not align with the original conceptual framework. Then, a new framework was posted as follow:

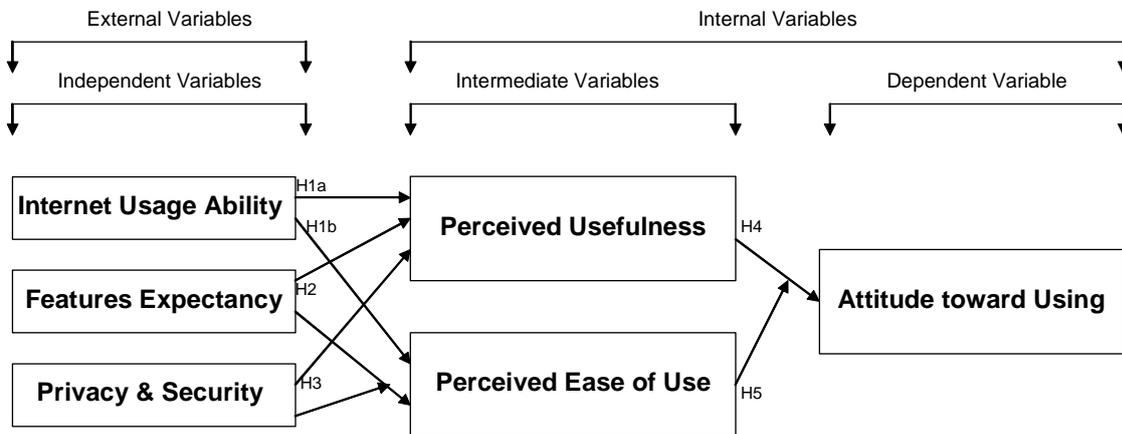


Figure 2 New Conceptual Framework from the Study

In Sum, consumers' attitudes toward using of e-Healthcare are discussed as follow:

This study was designed to explore the issues of consumers' attitudes toward using of e-Healthcare. Based on TAM, researcher proposed the Model of Consumer Acceptance of e-Healthcare, which was aimed to focus on gaining insights into consumer adoption behavior to be of a guideline to design and accommodate the range of needs and concerns of consumer to interact with e-Healthcare website.

A primary factors contribution of the study which includes internet usage ability, feathers expectancy, privacy and security, perceived ease of use, perceived usefulness are proved that they all influence the attitudes toward using. Therefore they should be develop together in order to promote the attitude toward using of e-Healthcare among consumers. This will rise up creditability, perception to the e-Healthcare.

7.2 Recommendation

1. Even though the rigorous validation procedure allowed us to develop a general instrument for measuring user factors affecting consumers' attitudes toward using of e-Healthcare, this work has limitation. All respondents are only located in Bangkok, therefore, other sample from different areas or nation should be gathered to confirm and refine, the factors structure of the TAM instrument and to assess its reliability and validity.

2. This study only focuses on patient perspective toward using of e-Healthcare. From the previous study the success of e-Healthcare is not only depends on patient side but also relates with a health provider e.g. physician and nurse who play a role of correspondence. Therefore it may require more study to focus on their perspective.

3. According to Technology Acceptance Model (TAM), further study efforts could develop and test hypotheses and theories relating to better understand consumer behavior that brings to behavioral intention and actual usage behavior in e-Healthcare context. This might help facilitate greater commitment of consumers to effective and continuous use of e-Healthcare website.

References

1. Baker L., Wagner T, Singer S. Bundorf M. (2003) Use of the Internet and e-mail for health care information: results from a national survey. *JAMA*. 289 (18):2400-6.
2. Liederman E, Lee J, Baquero V & Seites P. (2005). *Patient-Physician Web Messaging - The Impact on Message Volume and Satisfaction*. *Journal of General Internal Medicine*. 20:52–57
3. Shone, R. (1981) Application of intermediate Microeconomics. Martin Robertson, Oxford press.
4. Suarez-Almazor, Maria E. (2004). Patient-physician communication. *Current Opinion in Rheumatology*.16 (2):91-95.
5. Yogesh Malhotra, Dennis F. Galletta. (1999).Extending the Technology Acceptance Model to Account for Social Influence: Theoretical Bases and Empirical Validation, *University of Pittsburgh*, p. 10, 12-14.
6. Venkatesh, V. (1999). Creation of Favorable User Perceptions: Exploring the Role of Intrinsic Motivation, *MIS Quarterly*, 23(2), 239-260.
7. Hu, P., Chau, P., Liu Sheng, O., & Tam, K. (1999). Examining the Technology Acceptance Model Using Physician Acceptance of Telemedicine Technology, *J. MIS*, 16(2), 91-112.
8. Igbaria, M., & Iivari, J. (1995). The Effect of Self-efficacy on Computer Usage, *Omega*, 23(6), 587-605.
9. Lee, Y., Kozar, K., & Larsen, K. (2003). The TAM: Past, Present, & Future, *Com. of AIS*, 12(50), 752-780.
10. Zmud, R. W. (1979). Individual Differences & MIS Success: A Review of the Empirical Literature. *Management Science*, 25:10), 966-979.
11. Chau, P. (1996). An Empirical Assessment of a Modified TAM, *J. MIS*, 13(2), 185-204.
12. Jeremy C Wyatt and Frank Sullivan. (2005). eHealth and the future: promise or peril?, 2005;331;1391-1393 *BMJ*
13. Chau, P. Y. K. & Hu, P. J., 2002, "Examining a Model of Information Technology Acceptance by Individual Professionals: An Exploratory Study," *Journal of Management Information Systems*, 184, 191-230.
14. Davis, F. D., 1989, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly*, 13, 319-339.
15. De Ruyter, K., Wetzels, M. & Kleijnen, M., 2001, "Customer Adoption of E-Services: An Experimental Study," *International Journal of Service Industry Management*, 122, 184–207.
16. Gefen, D., 2000, "E-Commerce: The Role of Familiarity and Trust," *Omega: The International Journal of Management Science*, 286, 725-737.