

RESEARCH BRIEF

The Extended Acceptance Model of the Use of Hospitals Information Systems in Thailand

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Innovation and technology are not only the results of individual action but also the work process that interacts with the team (National Quality Award Office, 2016). The process may be established by solving the problem in the creative process of organization and technology development used in various areas, including personnel, customers, and stakeholders. Due to the management of corporate culture and atmosphere, innovative and valuable technology promotes and facilitates more accurate work.

The progressing development of modern technology that results in a competition of innovation and technology for business survival is a factor that encourages organizations to adjust their visions and strategies to be an excellent organization. The innovation and technology providing guidelines for services that are consistent with the current situation are created for a sustainable competitive ability.

For everyday life, information technology is a very important means of communication, such as the use of the Internet to help search for various information (Yuen, 2008). It is inevitable to get involved with information and communication technology (ICT), which is the computer that quickly helps increase the ability to calculate and process large amounts of existing data. In addition, it is able to store large amounts of data. Moreover, it is easy to communicate with time-saving devices and provide accurate information.

However, despite the widespread use of information technology, it still encounters problems and obstacles

due to the acceptance of usage without the ability to use it in a cost-effective manner (Chavisa, 2011). Furthermore, in the organization, personnel have different attitudes in accepting information technology due to various reasons: (1) some people refuse to use information technology as the system in use may not match the nature of the job for which they are responsible, (2) they are not ready to use various systems causing concern when there is a problematic issue because there is no one promptly helping solve the problem, and (3) they feel unsuccessful while using the system. As a result, the use of information technology does not respond to the purpose and cannot achieve its usefulness. Thus, making an overview of the introduction of information technology into a new working system or replacing the manual system is still limited to increase the performance as expected. Furthermore, the information system cannot be accomplished to be suitable for analyzing various data and planning management system (Siripong, 2012).

Thailand's medical policy, under Thailand 4.0 and Ministry of Public Health, is currently divided into: (1) Healthcare 1.0, which focuses on traditional medicine; (2) Healthcare 2.0 as the current medical plan; (3) Healthcare 3.0, which adds to the hospital accreditation, standards, and quality of public health enterprises; and (4) Healthcare 4.0, which focuses on "Smart Hospital and Smart Healthcare," as well as the policy of advancing the development of service systems to progress towards a smart hospital.

Smart Hospital has guidelines for the preparation of a paperless hospital by replacing the paper medical records of outpatients with digital records through information technology. Then, the public can register for treatment by choosing a self-service clinic. Thus, technology helps serve patients faster as waiting time is reduced. The system is being planned to be expanded to record nursing care (Nurse note) using a computer program. The program will provide early warning signs, both for service providers and patients, on drug allergy, redundancy drug interactions, safe treatment, as well as doctors' appointments. Mobile health information services will change the hospitals' information systems into a digital system (Phiwat Thai Public Health Foundation, 2018).

Health information system (HIS) is used for patients' information management and convenient communication of health information or medical records. For example, if the patient needs to be treated at other hospitals, recording data in paper may cause loss of time and complicate the information, easily resulting in errors and legal restrictions. In addition to the rules that protect personal information and identity verification, such as the national health act and electronic transaction act which results in different information on software and data standards of each hospital, the data from the digital government development plan found that the hospitals receive insufficient funding from the government. Moreover, many healthcare personnel lacks digital skills, causing unbelief in the electronic data reliability (Public Health Agency, 2016), which will certainly affect the service provided by the hospital due to lack of improvement or problem solutions.

Despite the more effective introduction of information systems in Thai hospitals for task management, a considerably updated information system should be developed. As the current trend of using information technology in hospitals has increased, the speed of receiving various services is required to support the dramatic changes in this era, wherein people are interested in convenience. Therefore, information systems specialists should take the general public into account in their ability to use such information systems without anxiety. This will subsequently lead to information technology adoption. The technology acceptance model (TAM) is, therefore, appropriate for this study to reflect various factors

affecting the acceptance of information technology in hospitals in Thailand.

We used a structural equation model (SEM) to develop and understand hospital information systems in Thailand and variables affecting HIS within 490 health service providers of government hospitals across the country. This research has focused on factors affecting the adoption of a hospital information system that facilitates the various services of the hospital to achieve the main objectives of this research.

Theoretical Background

TAM, developed by Davis (1989), potentially illuminates users' actions and behavior, reasons for technology acceptance, and use, which consist of two factors—perceived usefulness (PU) and perceived ease of use (PEOU). TAM provides the ability to predict the intention to use information systems when there is new information or when using technology. TAM model and factors that will affect the technology acceptance need the understandings of the reasons for acceptance and refusal to possibly predict them and improve the increasing user acceptance. According to the supplementary study of Venkatesh and Davis (2000), TAM can explain the intention to use resulting from knowledge and understandings of the technology. In addition, TAM has been studied together with the health care information technology application to prove the mentioned application acceptance (Parag, Mehdi, & James, 2001; Goodhue, 1995). Furthermore, the willingness to test new technologies for healthcare (Personal innovativeness) was additionally enhanced (Chung-Hung et al., 2010).

For health care modernization, information technology has been generally introduced to improve the quality of patient care, enhance efficiency and effectiveness, and greatly reduce operating costs (Aggelidis, P. V., & Chatzoglou, D. P., 2009). HIS in public services, especially in public hospitals, therefore, is indispensable in providing high-quality healthcare services (Ahmadi, H. et al., 2015). However, HIS also helps support information technology management in developing various programs that support data services (Rogers, 1983; Barbara H. Wixom & Hugh J. Watson., 2001), which are large and complicated in the hospitals based on the users facility. They have been designed to provide hospital services such as patient management. In addition, HIS has also been

utilized by other organizations to conveniently increase the environment of nursing home care management (Haux, 2006).

The significant role of HIS is in hospital information technology, which is essential for evaluating usage by healthcare professionals through the hospital information system (Marin, 2007). The doctors are the primary users of HIS in providing health care services. The system can help them gather patients' necessary information to support healthcare (Rai-Fu, C., & Ju-Ling, H, 2012).

According to Alquraini, Alhashem, Shah, and Chowdhury (2007), users, especially medical personnel, may be resistant and unsatisfied if the HIS design is not as good as it should be—the designed systems are too difficult or inconvenient to use.

Therefore, attention should be given to the various views of experts and medical personnel measuring whether the HIS used for health services is successful or not (Alquraini et al., 2007; Oroviogioicoechea et al., 2008).

As a result, the important thing to consider is whether the system will potentially meet the users' needs and if there is any impact on actual HIS usage or not.

Research Model and Hypotheses

The research model shown in Figure 1 depicts a series of relationships that explain the acceptance model of the use of HIS in Thailand. The model makes use of the principles and extends to TAM, but incorporates the best construct to determine the external factors of user acceptance on HIS. This study extends to the application of task-technology fit (TTF), personal innovativeness in information technology (PIIT), and self-efficacy based on HIS adoption.

TAM is used as a tool to predict the adoption of technology. In addition, it can test healthcare to study the factors of user acceptance and the relationship between structures (Yarborough & Smith, 2007; Melas, C. D. et al., 1980). Based on the study of Jung and Berthon (2009), the research model was established based on successful health technology using TAM, including checking the relationship between compatibility, trust, and perceived benefits. Maass and Varshney (2012) widely studied the intended use of information systems for healthcare and found

that perceived ease of use had a positive effect on perceived benefits and intended use.

PEOU assesses the likelihood of the user on the use of a system or the increase of efficiency of his or her work (Wu, Li, & Fu, 2011). Perceived ease of use means that the user has the level of expectation and desire to expect the goals and efforts to be fully utilized (Davis, Bagozzi, & Warshaw, 1989).

Perceived usefulness (PU) is an individual use of technology without the need for additional efforts (Elbeltagi et al., 2005). According to the analysis of (Hernandez, B. et al., 2008), PEOU has a positive relationship with perceived benefits. Utilization (UT) refers to the perceived usefulness of a person who believes that the system will help increase work efficiency (Wilson, Kickul, & Marlino, 2007). Utilization influences positive user behavior towards the need for acceptance edited by TTF (Yarborough & Smith, 2007). In addition, users recognize and gain more experiences with the benefits of HIS and support individual performance improvement (Chen & Hsiao, 2012). Therefore, the research hypotheses are as follows:

H1: Perceived Ease of Use (PEOU) of the HIS has a positive effect on HIS acceptance.

H2: Utilization (UT) of the HIS has a positive effect on HIS acceptance.

TTF is defined as a user acceptance pattern; the technology characteristics which are appropriate to the job will make the work more efficient and acceptable to users (Goodhue & Thompson, 1995). TAM and TTF, which significantly overlap in integration, can make the model more complete because TAM focuses on the attitudes towards specific information technology use and depends on perceived usefulness as well as perceived ease of use. TTF focuses on information technology capabilities to support the work and meet users' needs (Dishaw & Strong, 1999). The specific characteristics of tasks, technology, and individuals, which are determined by job suitability, will affect the basis of technology and efficiency (Mălăescu, I., & Sutton, S.-G., 2015).

Technology characteristics (TEC) are defined as the technology people use for operations such as system and computer equipment (Goodhue & Thompson, 1995). It is also a tool that users use to operate work

based on the features and other factors, which affect the use and include user perception (Tam, C., & Oliveira, T., 2016).

Task characteristics (TAC) are defined as the person who adjusts the action from the input to the result (Goodhue & Thompson, 1995). Task characteristics are one factor that affects users and understand technology use (Lu, J. et al., 2003). Moreover, task characteristics and technology characteristics are the abilities to predict the good structure of the TTF and have a direct effect on the result variables, such as performance or utilization (Ghada, 2015). The characteristics of TTF’s technology will determine the efficiency of HIS usage and affect user acceptance (Dishaw & Strong, 2002). Thus, we hypothesize that:

- H3: Task characteristics have a positive effect on the task technology fit in HIS.
- H4: Technology characteristics have a positive effect on the task technology fit in HIS.
- H5: Task technology fit has a positive effect on user’s utilization and acceptance in HIS.

Personal innovativeness in information technology (PIIT) demonstrates the commitment of individuals to learn new things through information technology (Agarwal & Prasad, 1998). In addition, the successful use of information systems depends on individual

differences (Cotte & Stacy, 2004). Many innovative users are willing to use new technologies and have performance expectations from PEOU and PU. Therefore, we hypothesize that:

- H6: Personal innovativeness in information technology (PIIT) has a positive effect on utilization (UT) in HIS.
- H7: Personal innovativeness in information technology (PIIT) has a positive effect on perceived ease of use (PEOU) in HIS.

Self-efficacy (SE) is defined as the result in a specific perception, perceived self-efficacy on the computer, and the Internet use will affect the user acceptance (Agarwal, Sambamurthy, & Stair, 2000; Lee, Hsieh, & Chen, 2011). Self-efficacy and perceived usefulness affect work motivation and expectations (Lee, D.-Y., & Lehto, M.-R., 2013). Therefore, we hypothesize that:

- H8: Personal innovativeness in information technology (PIIT) has a positive effect on self-efficacy (SE) in HIS.
- H9: Self-efficacy (SE) has a positive effect on perceived ease of use (PEOU) in HIS.
- H10: Self-efficacy (SE) has a positive effect on utilization (UT) in HIS.

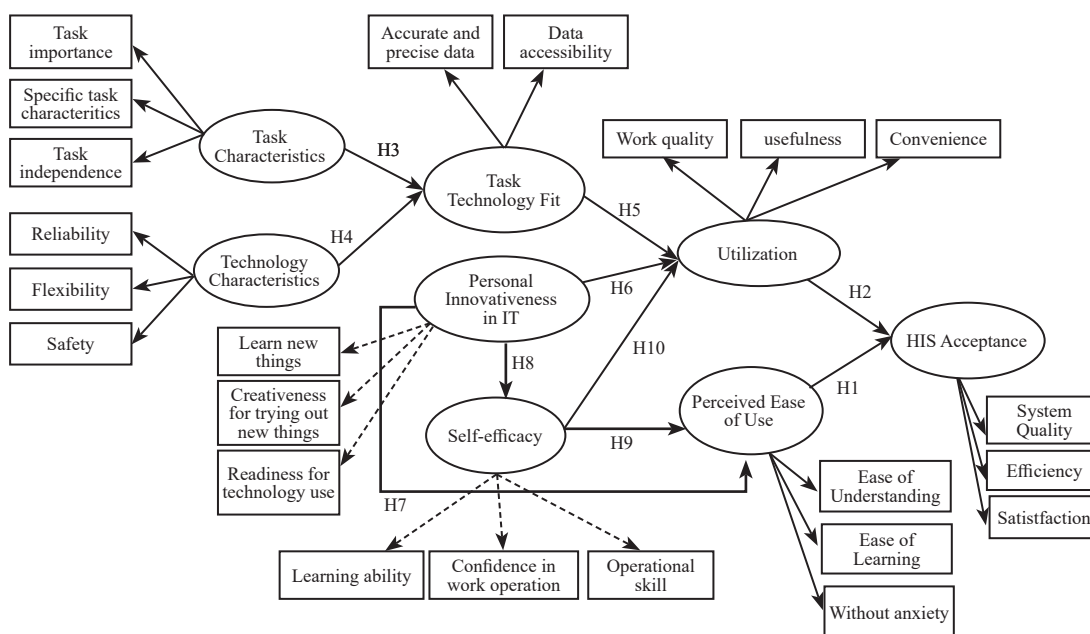


Figure 1. Hypothesis framework.

Methods

We developed our items by adopting measures that have been validated in prior studies (Rai-Fu, C., & Ju-Ling, H., 2012; Hossein, 2015; Handayani et al., 2017; Khalifa, M., & Alswailem, O., 2015; Nasriah & Shafiz, 2016; Vassilos & Prodromos, 2009; Handayani, P. W. et al., 2016) and modified them to fit in the context of HIS format. Normally, 200–400 participants are applied to fit the model with 10–15 observed variables (Bacon, 2001). To cover the sample group nationwide, a stratified random sampling method was used by categorizing the hospitals into two groups and selecting the sample group from 33 regional hospitals in each health zone. The sample size was determined to be 20:1 (Stevens, 1986; Schumacker & Lomax, 2010; Hair et al., 2014). A total of 490 surveys were conducted to healthcare providers in state hospitals throughout the country.

The study results used to describe the reliability of factors were extracted from the study's 7-point Likert scale questionnaire (Likert, 1932). The respondents

were categorized into gender, age, level of education, experience in doing work, and experience in using information systems of the hospitals, as shown in Table 1.

Results

Confirmatory Factor Analysis (CFA)

After a review of relevant literature, a CFA analysis was used to test the interrelationships of the observed and latent variables, as shown in Table 2. By analyzing the CFA items with AMOS, the results of the assimilation of hypothesized models and empirical data with structural equation model analysis (SEM) found that the model according to the hypothesis was not in harmony with empirical data, which was determined by the fit index as follows: chi-square value different without statistical significance at the level .05 ($\chi^2 = 525.594$; $df = 218$; $p\text{-value} = .000$; $CFI = .964$; $GFI = .915$; $AGFI = .892$; $RMSEA = .054$; $\text{Chi-square} / \text{DF} = 2.411$) as shown in Table 3.

Table 1

Demographic Characteristics (n = 490)

Demographic categories		Frequency	Percentage
Gender	Male	231	47.1 %
	Female	259	52.9 %
Age	<25	28	5.7 %
	25-30	222	45.3 %
	31-35	211	43.1 %
	36+	29	5.9 %
Level of education	Bachelor	299	61.0 %
	Higher than bachelor's degree	191	39.0 %
Experience in doing work	< 5	44	9.0 %
	5 - 10	226	46.1 %
	11 - 15	194	39.6 %
	> 15	26	5.3 %
Experience in using information systems of the hospitals	≤ 3	65	13.3 %
	4 - 6	248	50.6 %
	7 - 9	143	29.2 %
	> 9	34	6.9 %

Table 2
CFA and Observed Variables for the Latent Variable

Variable	AVE	Observed variables	Loadings	R ²
Task characteristics	0.685	Task importance	0.62	0.43
		Specific task characteristics	0.69	0.53
		Task independence	0.75	0.57
Technology characteristics	0.759	Reliability	0.73	0.55
		Flexibility	0.77	0.60
		Safety	0.78	0.59
Task technology- fit	0.789	Accurate and precise data	0.80	0.65
		Data accessibility	0.78	0.61
Utilization	0.823	Work quality	0.81	0.65
		Usefulness	0.81	0.65
		Convenience	0.84	0.68
Perceived ease of use	0.812	Ease of understanding	0.81	0.65
		Ease of Learning	0.82	0.65
		Without anxiety	0.80	0.62
Personal innovativeness in IT	19.034	Learning new things	0.77	0.59
		Creativeness for trying out new things	0.72	0.54
Self-efficacy	0.795	Learning ability	0.78	0.61
		Confidence in work operation	0.80	0.65
		Operational skill	0.80	0.65
HIS acceptance	0.822	System quality	0.81	0.66
		Efficiency	0.81	0.65
		Satisfaction	0.85	0.64

Measures and Data Collection

The model acceptance of the use of HIS has second-order latent variables in the research model. The obtained results, as shown in Table 4, illustrate the overall fit indexes of the model, which include good results for Tucker-Lewis index (TLI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), root mean square of error of approximation (RMSEA), and X^2/df . Thus, the findings can be concluded that the model has reached an acceptable level and could be used to explain the set hypotheses. The results for the reliability and validity measurement are presented in Table 4.

Table 4 shows the results of hypothesis testing, whereas Table 6 presents the results after adjusting the model. From the results, we conclude that:

- H1: There is no causal relationship between PEOU of HIS and HIS acceptance. The results on standardized regression weights scale indicate an estimate value = -0.025, C.R. = -0.174, and p-value > 0.05.
- H2: There is a significant causal relationship between utilization and HIS acceptance. The results on standardized regression weights scale indicate an estimate value = 0.942, C.R. = 6.619, and p-value < 0.001.
- H3: There is no causal relationship between task characteristics and TTF. The results on standardized regression weights scale indicate an estimate value = 0.176, C.R. = 1.797, and p-value > 0.05.

- H4: There is a significant causal relationship between technology characteristics and TTF. The results on standardized regression weights scale indicate an estimate value = 0.806, C.R. = 8.301, and p-value < 0.001.
- H5: There is a significant causal relationship between TTF and utilization. The results on standardized regression weights scale indicate an estimate value = 0.907, C.R. = 2.841, and p-value < 0.05.
- H6: There is no causal relationship between personal innovativeness in information technology and utilization. The results on standardized regression weights scale indicate an estimate value = 0.093, C.R. = 0.192, and p-value > 0.05.
- H7: There is no causal relationship between personal innovativeness in information technology and PEOU. The results on standardized regression weights scale indicate an estimate value = 0.329, C.R. = 0.788, and p-value > 0.05.
- H8: There is a significant causal relationship between personal innovativeness in information technology and self-efficacy.

The results on standardized regression weights scale indicate an estimate value = 1.030, C.R. = 17.799, and p-value < 0.001.

H9: There is no causal relationship between self-efficacy and PEOU. The results on standardized regression weights scale indicate an estimate value = 0.718, C.R. = 1.783, and p-value > 0.05.

H10: There is no causal relationship between self-efficacy and utilization. The results on standardized regression weights scale indicate an estimate value = 0.041, C.R. = 0.100, and p-value > 0.05.

Table 7 shows the extent of direct influence, indirect influence, and total influence of variables on the acceptance model of the use of HIS.

1. The two variables, which have direct effects on the acceptance model of the use of HIS, include utilization having a positive direct effect with coefficient 0.985, and perceived ease of use with the negative coefficient -0.025.

Table 3
Goodness of Fit

	TLI	GFI	AGFI	CFI	RMSEA	X ² /df
Model	0.958	0.915	0.892	0.964	0.054	2.411
Threshold	≥ 0.90	≥ 0.90	≥ 0.90	≥ 0.90	≤ 0.08	≤ 3.0

Table 4
Goodness of Fit

	TLI	GFI	AGFI	CFI	RMSEA	X ² /df
Model	1.004	0.974	0.959	1.000	0.000	0.866
Threshold	≥ 0.90	≥ 0.90	> 0.90	> 0.90	< 0.08	< 3.0

Table 5
Reliability and Validity of the Second-Order Variables

Variable	Item	Loadings	AVE	Cronbach's alpha
Task characteristics	Task importance	0.62	0.685	0.850
	Specific task characteristics	0.69		
	Task independence	0.75		
Technology characteristics	Reliability	0.73	0.759	0.890
	Flexibility	0.77		
	Safety	0.78		
Task-technology fit	Accurate and precise data	0.80	0.789	0.853
	Data accessibility	0.78		
Utilization	Work quality	0.81	0.823	0.906
	Usefulness	0.81		
	Convenience	0.84		
Perceived ease of use	Ease of Understanding	0.81	0.812	0.897
	Ease of Learning	0.82		
	Without anxiety	0.80		
Personal innovativeness in IT	Learning new things	0.77	0.746	0.887
	Creativeness for trying out new things	0.72		
	Readiness for technology use	0.75		
Self-efficacy	Learning ability	0.78	0.795	0.898
	Confidence in work operation	0.80		
	Operational skill	0.80		
HIS acceptance	System Quality	0.81	0.822	0.897
	Efficiency	0.81		
	Satisfaction	0.85		

2. Variables that have indirect effects on the acceptance model of the use of HIS have five variables, namely,

- 2.1 Personal innovativeness in IT, which has an indirect effect on the acceptance model of the use of HIS through the utilization with coefficient 0.090;
- 2.2 Technological characteristics, which have an indirect effect on the acceptance model of the use of HIS through the TTF and utilization with coefficient 0.690;

2.3 Task characteristics, which have an indirect effect on the acceptance model of the use of HIS through the TTF and utilization with coefficient 0.133;

2.4 Self-efficacy, which has a positive indirect effect on the acceptance model of the use of HIS through perceived ease of use with coefficient 0.019; and

2.5 TTF, which has an indirect effect on the acceptance model of the use of HIS through utilization with coefficient 0.832.

Table 6

Relative Influence of Items (Standardized Regression Weights) (N=490) Results After Adjusting the Model

Hypotheses	Estimate	S.E.	C.R. (t-value)	P-value	Significance
H1: HIS ← PEOU	-0.025	0.142	-0.174	0.862	rejected
H2: HIS ← UT	0.985	0.142	6.619	***	supported
H3: TTF ← TAC	0.165	0.098	1.797	0.072	rejected
H4: TTF ← TEC	0.830	0.097	8.301	***	supported
H5: UT ← TTF	0.839	0.319	2.841	0.005**	supported
H6: UT ← PIIT	0.082	0.485	0.192	0.848	rejected
H7: PEOU ← PIIT	0.298	0.417	0.788	0.431	rejected
H8: SE ← PIIT	0.976	0.058	17.799	***	supported
H9: PEOU ← SE	0.687	0.403	1.783	0.075	rejected
H10: UT ← SE	0.038	0.409	0.100	0.921	rejected

Note. ** p < 0.01, *** p < 0.001, Critical ratios (t-values) more than 1.96 are significant at the 0.05 level.

Table 7

Summary of Direct Influence and Indirect Influence and Total Influence on the Acceptance Model of the Use of HIS

Variable	Direct influence	Indirect influence through other variables	Total influence
Personal Innovativeness in IT	0	$(.08*.99) + (.30*-.03) + (.09*.69*-.03) = 0.110$	0.110
Technology Characteristics	0	$(.83*.84*.99) = 0.690$	0.690
Task Characteristics	0	$(.17*.84*.99) = 0.133$	0.141
Self-efficacy	0	$(.69*-.03) + (.04*.99) = -0.060$	-0.060
Task-Technology Fit	0	$(.84*.99) = 0.832$	0.832
Perceived Ease of Use	-0.025	0	-0.025
Utilization	0.985	0	0.985

From the acceptance model of the use of HIS in Thailand, the results of the hypotheses analyzed by CFA with the AMOS computer program found that the chi-square is not significantly different at the level of .05 (= 149.77; df = 173; p = .90; GFI = .97; AGFI = .96; RMSEA = .000; Chi-square/DF = .87). The results indicate that the measurement model is consistent with empirical data or having a presumptuous match that corresponds to the statistical value by considering the harmonic index (GFI) equal to .97 and the adjusted harmony index (AGFI) equal to .96. The GFI and AGFI values are greater than .90.

According to both values, the closer to 1 describes that the measurement model is in harmony with empirical data. For the index, the model error value is the root index of the square mean of the error estimate (RMSEA) equal to .00, which is less than .08, indicating that the measurement model is consistent with empirical data quite well. When considering the relative chi-square, which is the ratio of the chi-square value to the independent layer (Chi-Square/df), it was found that the value is .86, which is lower than 3. In this model, the overall adoption of HIS in Thailand is a component of each observed variable weighing

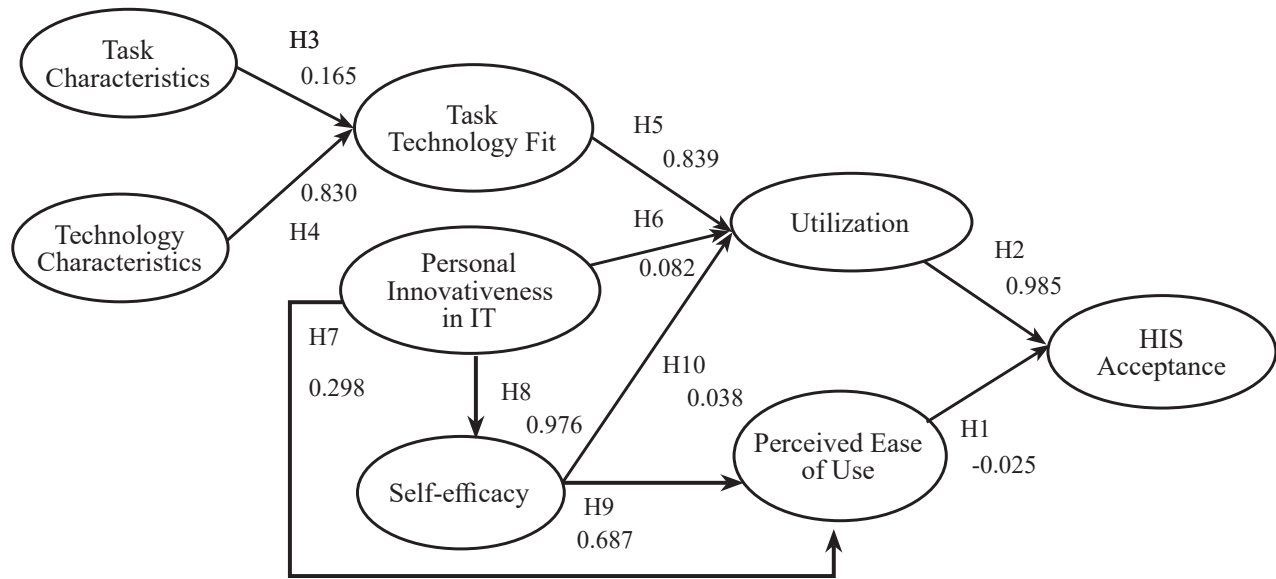


Figure 2. Empirical model.

between .62 and .85 with statistical significance at .001 level. It was also found that the estimate of the overall error (Residual) is consistently related to the values between .38 and .68, as shown in Figure 2.

Discussion

According to research studies, in terms of the analysis of the consistency of HIS acceptance model established with empirical data to develop an acceptance model of the use of HIS along with the direct, indirect, and the total influence of variables in HIS adoption to achieve the objective, the results show that perceived ease of use and acceptance of information system usage have negative correlation. In other words, they illustrate that perceived ease of use does not play a role in the acceptance model of the use of HIS with the negative correlation coefficient -0.025, and p -value > 0.05 . This may result from user anxiety about system operation, which may cause concern if the system is faulty while in use. The organizations should relieve it by providing a center for receiving notification of errors in task operation and allocating knowledgeable personnel to give advice and correct errors in system usage throughout time. This may lead to user acceptance without anxiety. For the result of the inverse correlation between perceived ease of use and HIS adoption, it is potentially because more users

feel that HIS is easy to use, there may be less usage. This finding did not support the results of previous studies (Handayani et al., 2017; Holden & Karsh, 2010; Aggelidis, P. V., & Chatzoglou, D. P., 2009; Chen & Hsiao, 2012; Pai & Huang, 2011). Thus, the mentioned information is not sufficient evidence to support H1.

HIS acceptance starts with utilization, which has a positive direct effect on HIS with the correlation coefficient 0.985, and p -value < 0.001 as users operate information systems acquiring efficient performance, leading to work achievement as an expected goal. This is relevant to the technology acceptance model, the use of human behavior theory to study the acceptance of technology (Goodhue, D. L., & Thompson, R. L., 1995; Legris & Collette, 2003; Davis, F. D. 1989; Venkatesh, V. et al., 2003). Goodhue, D. L., and Thompson, R. L., (1995) found that efficiency and utilization would increase when the technology used matches the mission that the user has to complete. This is consistent with the previous research (Yarbrough, A., & Smith, T., 2003; Wilson et al., 2007; Lee, C.-C. et al., 2007; Fildes, Goodwin, & Lawrence, 2006), which found that utilization has a positive effect on user's willingness to accept. Therefore, it can be concluded that the mentioned information is sufficient evidence to support H2.

In addition, technology characteristics have no correlation with the suitability of technology in HIS

with the correlation coefficient 0.165 and p -value > 0.05 because HIS may not be much modified in line with user needs. Additionally, users may not trust the system to maintain confidentiality; therefore, the organization should ensure system users that there will not be information leaks to the outside world. Therefore, it is concluded that the mentioned information does not support H3.

Task characteristics have a positive correlation with the appropriateness of technology in HIS with the correlation coefficient 0.830, and p -value < 0.001 . This is probably because each specific task characteristic in the hospital may result in its practical modification, as well as the various systems which may be modified to respond to users' need. This finding supports the results of previous studies (Goodhue & Thompson, 1995; Tiago, O. et al., 2014; Yen, D. C. et al., 2010; Aljukhadar, Senecal, & Nantel, 2014; Wu, B., & Chen, X., 2017). Therefore, it is concluded that the mentioned information supports H4.

In terms of the TTF, it has a positive effect on the utilization of HIS with a correlation coefficient of 0.839 and a p -value < 0.001 . This may be because information technology processing can provide standardized outcomes. The users can simply access the information in the system anytime, anywhere. This is relevant to the research (Chen & Li, 2010; Fildes et al., 2006; Lu, J. et al., 2003; Dishaw & Strong, 1999), which found that task characteristics and technology characteristics affect users, perception, and application to determine a criterion for the accomplishment of HIS application, as well as its application in users' opinions. Therefore, it is concluded that the mentioned information supports H5.

Personal innovativeness in technology has no causal relationship with utilization and perceived ease of use in HIS with a correlation coefficient 0.082, 0.298, and p -value > 0.05 , respectively. This may be due to hospital personnel who have the ability to use the system or technology, and they are ready to use the information system at any time. However, there may be an idea of the ability for work achievement without information systems as well. When personnel starts trying out new things to implement information systems in their work, they may overlook the level of perceived ease of use. They understand that in case of problems at work, they can solve the problems themselves by consulting the manual of information system usage. This finding did not support the results of previous studies (Jackson,

J.-D., 2013; Yi, Fiedler, & Park, 2006; Lin & Filieri, 2015; Yujong, 2014). Therefore, it is concluded that the mentioned information does not support H6 and H7.

Personal innovativeness in technology has a positive effect on the self-efficacy of individuals in HIS with correlation coefficient of 0.976 and p -value > 0.05 , respectively. This shows that users can adopt new technologies to help improve the use of information systems and propose new approaches in the use of information systems, as well as be ready to use it to support work. This is consistent with the previous research (Agarwal & Prasad, 1998; Thatcher & Perrew, 2002; Venkatesh, V. et al., 2003), which found that personal innovativeness is the use of new information technology for perception and has a positive effect on self-efficacy that will make users confident in using technology, including the experience of using and willing to use HIS. Therefore, the mentioned information supports H8.

However, self-efficacy has no causal relationship with perceived ease of use and utilization in HIS with correlation efficiency of 0.687, 0.038, and p -value > 0.05 , respectively. It is probably because personnel have the skills, knowledge, and understandings in using the system and as well as solve problems on their own. This makes the personnel not perceive the ease of use, but recognize that the information system can help enhance the performance. Thus, self-efficacy has no correlation with usefulness because, to successfully achieve work quality as expected, a goal requires not only self-efficacy to use technology for work quality but the information system in which all personnel use (Chen, K., 2011; Yi & Hwang, 2003; Chen, Yen, & Chen, 2009; Abdullah, F. et al., 2016; Ozturk, A.-B. et al., 2016; Rahman, M.-S. et al., 2016). Therefore, it is concluded that the mentioned information does not support H9 and H10.

Declaration of ownership

This report is our original work.

Conflict of interest

None.

Ethical clearance

This study was approved by the institution.

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