What Drives Mobile Health Care? An Empirical Evaluation of Technology Acceptance

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Abstract

The proliferation of mobile communication and computing technologies in supporting highly specialized tasks and services in health care has made it increasingly important to understand the factors essential to technology acceptance by health care professionals. This paper presents a conceptual model to examine what determines medical professionals' acceptance of mobile healthcare systems. The structural equation modeling technique was used to evaluate the causal model and confirmatory factor analysis was performed to test the reliability and validity of the measurement model. The results indicate that compatibility and computer self-efficacy (CSE) have significant direct effect on behavioral intent, whereas technical support and training have strong indirect impact on behavioral intent through the mediator of CSE. Among these, the compatibility has the most significant contribution to behavioral intent. Yet, the hypothesis for management support effect on behavioral intention to use is not supported.

1. Introduction

The healthcare industry, conventionally, is recognized as having been lagged behind other industries in the use and adoption of new information technologies (IT) and information systems (IS) [7, 21, 28]; however, this situation is gradually shifting at a fast pace. Modern IT/IS is an essential tool not only to foster and promote the progress of health care, but also to drastically reform current health care practices. Applications of mobile IT/IS in health care can be recognized as both emerging and enabling technologies [2, 12], which have been applied in several countries for either emergent care or general health care. For example, the variety of wireless technologies such as mobile computing, wireless networks and global positioning systems (GPS) have been applied to ambulance care in Swedish [16] and emergent trauma care in Netherlands [11]. Relative information about the patient (vital information) and the ambulance (exact time and location) can be transmitted to the hospital in real-time. Therefore, the hospital can be well-prepared for the arriving of the ambulance at any time. The goal is to provide the optimal treatment and right hospital to the patient at the right time [11, 16]. Furthermore, in Finland, a system with secure mobile healthcare services has been tested in 2003 and will be available nationwide in 2004, including health consulting, electronic prescription, etc. Authorized individuals can easily access to the system via mobile devices such as mobile phones [25].

While we have recognized a number of advantages and demands to employ new mobile IT/IS in healthcare e.g., improving the patient care and services quality and increasing the care efficiency [2], most applications, in fact, have failed [6] or have not been implemented as predicted [33]. Among these, 30% out of the failure rate is resulted from non-technical factors [26]. Insufficient user acceptance has long been an obstacle to the successful adoption of new IT/IS. The explosion of new IT/IS in supporting highly expert tasks and services has made it extremely significant to probe the determinants essential to new technology acceptance by healthcare professionals.

Generally, the essential characteristics of users and technologies in the context of professional healthcare may greatly differ from those in customary commercial context [8]. Therefore, the purpose of this study is to develop a conceptual model based on theoretical foundations (e.g., technology acceptance model, innovation diffusion theory, and computer self-efficiency) to examine and validate the factors that determine the IT/IS acceptance of mobile healthcare. A structural equation modeling technique is employed to simultaneously test the measurement and the structural model.

The conceptual model guiding this study is described in the following section, beginning with a brief review, and then presents a conceptual framework for assessing medical professional behavioral intention to adopt mobile healthcare system (MHS). Section 3 presents the research method. Section 4 analyzes the data and tests the model. The last section concludes with the findings, implications, limitations and future research directions.

2. Conceptual model and research hypotheses

In this study, MHS refers to the overall healthcare information processing, including all relative medical professional participants and the use of new IT/IS to exchange healthcare information and services via mobile devices anytime and anywhere [8, 15, 7, 18]. The integrated mobile IT/IS can have an easy access to the networks and resources whether the care professionals or patients are stationary or moving. The variety of mobile devices includes personal digital assistants (PDAs), laptops, notebooks, GPS, smartphones, etc [34, 25, 18]. While system use is recognized as a good indicator of IT/IS success, user adoption and system acceptance can be predicted adequately from the behavioral intent. A number of empirical researches have evident this point [8, 15, 23]. The acceptance and usage of MHS mean that healthcare professionals are accepting and using the specific mobile technologies and innovations.

Based on our observation and backed up by literature review, there are several important factors to determine the success of new IT/IS in health care; for example, the reluctance of healthcare professionals to use systems as a consequence of restrictions in their IT skills [33, 14]. Other potential determinants may hide behind the following questions: how the new IT/IS compatible with healthcare practitioners' current working practices, how the new mobile IT/IS introduced in the healthcare organizations, how the quality of information and systems offered, what kind of training programs, resources and supports provided, as well as the incentive of the care professionals and their use of the system [2].

Prior researches indicated that individual's behavioral intention can provide a better understanding of explanation and prediction of IT/IS acceptance; based on those studies, we reasonably focus on exploring the relative variables (e.g., compatibility, computer self-efficacy, technical support and training, and management support) and examine the relationships between those variables and behavioral intent. To exploring the care professionals' psychological and behavioral changes in the MHS context, the following sections described relative researches and theoretical foundations.

2.1 Technology acceptance and innovation diffusion theory

The users' acceptance of new IT/IS is the primary factor in IT/IS success [15]. There are many technology acceptance models developed to predict and explain human behavior; for example, Triandis' theory of interpersonal behavior (TIB) [36], Fishbein and Ajzen's theory of reasoned action (TRA) [13], Rogers's innovation diffusion theory (IDT) [31, 32], Ajzen's theory of planned behavior (TPB) [1], and Davis's technology acceptance model (TAM) [10]. Individual's behavioral intention involved in all of these theories as a precursor to predict and explain individual's acceptance behavior.

Though healthcare organizations are considerably interested in assessing whether all professionals will adopt a new mobile IT/IS; it is a challenge to examine actual adoption behaviors prior to product launch or in its early experimental stage. Nevertheless, we must consider measures to be closely related to adoption behavior, such as overall attitude towards the new IT/IS or intention to use. In this study, we center on intention to use as a crucial determinant because it represents the final precursor to actual adoption behavior. MHS adoption refers to healthcare professionals' psychological state regarding individuals' intention to use MHS in their practice. Thus, the dependant variable measured in the study is the intention to use MHS. Individual's intention to use MHS is recognized as a preceding construct of individual's actual use of the new technology.

IDT is a well-known theory, which was proposed by Rogers [31, 32], and has been extensively applied to relevant IT/IS researches. The central concept of IDT consists of five significant innovation characteristics, e.g. relative advantage, compatibility, complexity, trialability, and observability. These characteristics provide better understandings for the user adoption and decision making process. They also evaluate the implementation of new technological innovations and elucidate how these variables interact with one another. Yet, only the relative advantage, compatibility, and complexity were consistently related to innovation adoption [30].

Compatibility refers to the degree to which the innovation is perceived to be consistent with potential users' existing values, prior experiences and needs [30, 31, 32]. High compatibility can result in preferable adoption. Any new IT/IS must meet users' needs, integrate within business processes, and should be designed as user-friendly. Prior researches indicated that compatibility had strong direct impact on and illustrated more of the variation in behavioral intention to use group support system [37] and to adopt new methodology for software development [19], whereas compatibility played the most significant direct factor of individual's intent to adopt university smart card [27]. These are consistent with other numerous empirical evidences that the more MHS is well-matched with clinical and patient care working practices, the higher MHS acceptance will be achieved [14, 23, 25, 26, 28, 34]. Hence, the following hypothesis is proposed.

H1. Compatibility has a direct effect on intention to use MHS.

2.2 Computer self-efficacy

Computer self-efficacy (CSE) represents an individual's perceptions of his or her ability to use computer in the accomplishment of a task [9], which is derived from the self-efficacy construct from social learning theory [4]. Self-efficacy implies an individual's belief in his/her ability to perform a specific task, which can be conducted to realize individuals' use and acceptance while implementing new specific tools [35]. It is built on the basis of four core information, e.g. previous experiences, observation of other's experiences, verbal persuasion, and affective arousal [5].

CSE is one of specific self-efficacy perceptions on engaging in computer-related activities, and considerably contributing to the prediction of individual's behavioral intent [22]. Lately, a number of researches have evidenced that CSE is a significant construct in determining individual's behavior toward future use of computers [5, 9, 29]. Therefore, CSE has been regarded as a dominant factor affecting IT/IS usage, especially in the early adoption stage. The mobile healthcare settings are still in its infancy. As previous studies stated, it will be a challenge for healthcare professionals to employ a new IT/IS such as MHS due to their low computer literacy [8, 14, 15]. The health care professionals with little confidence in their capability to adopt mobile computing may cause poor performance on mobile healthcare as well as result in diminishing their intentions to use MHS. Therefore, the following hypothesis is proposed.

H2. Computer self-efficacy has a direct effect on intention to use MHS.

2.3 Support factors

Support is another crucial factor to new IT/IS acceptance because there are theory and evidence to assert that individual perceptions in new IT/IS acceptance may increase over time with sufficient support [9, 24]. To facilitate the efficient and effective mobile health care, it is essential to have a better understanding about what exactly practitioners need and to improve their technical skills with necessary and well-matched resources (including wireless network infrastructures, hardware/ software, consultants and all relative information), e.g., portable communication devices with easy access to medical and patient's information. While support comprises various perspectives of users' demands such as technical consultants, relative training programs, appropriate and sufficient resources from either internal or external organizations [24], these will attribute to two major constructs: technical perspective (i.e. technical support and training) and non-technical perspective (i.e. management support).

For the technical perspective, several researches [5, 9, 20, 35] asserted that given valuable training programs and technical supports will efficiently enhance individuals' capability and their perception of the capability. As a result, CSE has strong correlations with technical support and training in the early stage of MHS implementation. Similarly, the management support can be characterized by the availability of mobile equipment resources and enabling care professionals to make use of those resources; meanwhile, healthcare organizations must provide practical solutions to difficulties in implementing or adopting MHS. Hence, not only required resources need to be appropriately and sufficiently allocated but healthcare working processes also need to be integrated and optimized to fit the new mobile IT/IS adoptions. These will make care professionals more comfortable with the context of MHS and enhance their confidence in using mobile IT/IS. Therefore, the following hypotheses are proposed.

H3. Technical support and training has a direct effect on individual's perception in computer self-efficacy.

H4. Management support has a direct effect on individual's perception of computer self-efficacy.

2.4 Research model and hypotheses

Based on the foregoing discussions, this study integrated behavioral intention to use, elicited from TAM2, with four additional variables (i.e., technical support and training, management support, compatibility, and computer self-efficacy) to model user acceptance in the mobile health care context. The initial research model is depicted as Figure 1.

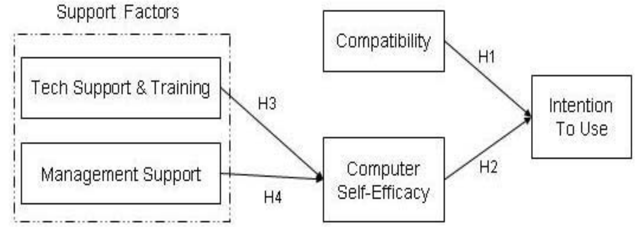

Figure 1. Conceptual model for mobile healthcare

3. Research methodology

3.1 Measurement development

A number of prior relative studies were reviewed to ensure that a comprehensive list of scales was included. All scales for each construct were taken from the previously validated instruments and modified based on the mobile healthcare context. The measures for technical support and training and management support were elicited from Igbaria et al. [24]. The construct for compatibility were obtained from Rogers [31, 32], whereas the items for computer self-efficacy were captured using three items derived from Compeau and Higgins [9] and Venkatesh et al. [38]. The scales for intention to use were adapted from previous researches on TAM [8, 10] and TIB [15].

The survey questionnaire was composed of three parts. The first part gave a concise instruction for this study and the definition of MHS. There were five questions in the second part, capturing the demographic characteristics of the subject. The last part recorded the subject's perception of each variable in the model. The demographic variables assessed were levels of hospitals, positions, and what mobile healthcare applications and mobile equipments were actually used by the subject. The last section asked each subject to indicate the degree of agreement with each item. All data were collected using a five point Likert-type scale from one being "strongly disagree" to five being "strongly agree".

Once the initial questionnaire was generated, an iterative personal interview process with the domain experts from medical institutes and well-known hospitals (including two faculties, three physicians, four nurses and two medical technicians) was conducted to verify the completeness, wording, and appropriateness of the instrument and to confirm the content validity. The review process was conducted to refine the instrument until no further modification to the questionnaire was needed. Several iterations were conducted and feedback served as a basis for correcting, refining and enhancing the experimental scales. Some scales were eliminated because they were found to represent essentially the same aspects as other scales with only slight wording differences. Some scales were modified because the semantics appeared ambiguous or irrelevant to MHS characteristics. The self-administered questionnaire consisted of 15 items measuring the five latent variables.

3.2 Subjects

Subjects for this study were users who engaged in mobile health care system, including physicians, nurses, and medical technicians who work for hospitals in Taiwan. Although Taiwan Government launched its national Mobile Infrastructure Project last year and claimed that to year 2006 Taiwan will be a mobile island. However, currently mobile health care in Taiwan is still at its early stage of promoting and implementing. Only few well-known hospitals have actually implemented or partially implemented MHS. Thus, we totally distributed 271 questionnaires with souvenir to all target hospitals that have actually or partially implemented. Data were collected via snowball and convenient sampling. Since the desired sample characteristic is extremely rare and the conventional low survey response rates in health care organizations, we endeavored to find out a specific local contact person in every hospital who was in charge of distributing the questionnaire and the follow-up activities. Two weeks seems an ideal period to expect most of the questionnaires to be returned. If a questionnaire was overdue by more than one week, follow-up activities were conducted by phone or e-mail to the contact person to ensure the returning of the questionnaire.

4. Data analysis and results

4.1 Descriptive statistics

Table 1. Demographic attributes of the respondents

Categories	Items	N	%
* Applications	M-emergency care systems	32	14.8
	M-order systems	51	23.6
	M-nursing systems	39	18.1
	M-home care systems	12	5.6
	M-health information systems	2	0.9
	M-PACS	76	35.2
	Others	4	1.9
* Devices	PDAs	33	23.2
	Panel PCs	19	13.4
	Tablet PCs	67	47.2
	Notebooks	19	13.4
	Others	4	2.8
Level	Medical center	77	69.4
	Regional teaching medical center	29	26.1
	Regional medical center	1	0.9
	Community teaching hospital	4	3.6
	Community hospital	0	0.0
** Ownership	Public	4	3.6
	Private	30	26.8
	Juridical person	78	69.6
Position	Physician	28	24.6
	Nurse	59	51.8
	Medical technician	27	23.7

Note. 1. N: means frequency.
2. M: means mobile.
3. *: indicates that respondents are allowed to choose more than one items in that category.
4. **: indicates 2 missing data in that category.

One hundred and thirty-six returned questionnaires were received after the two follow-up activities. Data were excluded to ensure the construct validity while respondents gave incomplete answers exceed 30% of the items for each construct [15]. Based on the screening criteria, there were no missing values within the major five constructs in all retained questionnaires except for two in demographics information. Totally, 22 were dropped because 10 gave invalid answers (e.g. never use MHS) and the rest 12 did not meet the criteria for the five constructs. This left 114 for the statistical analysis, a 42.06 % valid return rate.

Table 1 illustrates the sample demographics. The data shows that the Picture Archiving and Communication Systems (PACS) and the mobile order system were the most and second frequently adopted MHS. Tablet PCs were the majority used equipments by clinical professionals in the mobile healthcare setting. The data also indicated that medical centers have the highest MHS implementation rate. In contrast, the public hospitals have the lowest implementation rate. Finally, among the subjects, nurses are the major MHS users.

4.2 The measurement model

The model included 15 items describing five latent constructs: technical support and training, management support, compatibility, computer self-efficacy, perceived and intention to use. The proposed research model was evaluated using structural equation modeling (SEM). The data obtained were tested for reliability and validity using confirmatory factor analysis (CFA). This step was used to test if the empirical data conformed to the presumed model. The CFA was computed using the LISREL software, and the maximum likelihood method was applied to estimate the parameters of the model.

Table 2. Model evaluation overall fit measurement

Fit Indices	Recommended value	Value
χ^2	N/A	127.44
df	N/A	83
χ^2/df	≤3.00	1.54
Goodness of Fit Index (GFI)	≥0.9	0.87
Normed Fit Index (NFI)	≥0.9	0.91
Non-Normed Fit Index (NNFI)	≥0.9	0.95
Comparative Fit Index (CFI)	≥0.9	0.96
Root Mean Square Residual (RMSR)	≤0.05	0.046
Root Mean Square Error of Approximation (RMSEA)	≤0.08	0.069

The measurement model test presented a good fit between the data and the proposed measurement model. For instance, the ration of χ^2 to degrees-of-freedom (127.44/83) was used because of its inherent difficulty with sample size. The χ^2/df value is 1.54, which falls well within the recommended levels of 1.0 to 2.0 by Hair et al. [17]. The various goodness-of-fit statistics are shown in Table 2. The goodness-of-fit (GFI) value of 0.87 is close to the recommended level of 0.9, and the RMSEA value of 0.069 falls well within the acceptable levels of 0.05 to 0.08 by Hair et al. [17]. The results showed that the measurement model has a good fit with the data based on other indices of fit such as GFI (0.87), NFI (0.91), NNFI (0.95), CFI (0.96), RMR (0.046), and RMSEA (0.069). Hence, we could proceed to evaluate the psychometric properties of the instrument in terms of reliability, convergent validity, and discriminant validity.

Table 3. Assessment of the construct reliability

Variables	Cronbach's α (> 0.7)	Composite Reliability (>0.6)	Average Variance Extracted (>0.5)
Tech Support and Training	0.82	0.80	0.57
Management Support	0.88	0.89	0.72
Compatibility	0.94	0.93	0.82
Computer self-efficacy	0.87	0.88	0.71
Intention to Use	0.94	0.94	0.83

Reliability and convergent validity of the constructs were estimated by Cronbach's α, composite reliability, and average variance extracted (see Table 3). Cronbach's α for all constructs were above the 0.7 threshold and ranged from 0.82 to 0.94. The composite reliability was estimated to evaluate the internal consistency of the measurement model and produced very similar results (ranged from 0.80 to 0.94). All were greater than the benchmark of 0.60 recommended by Bagozzi and Yi [3]. As depicted in Table 3, the average variance extracted for all measures also exceeded the recommended 0.5 level (ranged from 0.57 to 0.83), which meant that more than one-half of the variances observed in the items were accounted for by their hypothesized constructs. This illustrates that all measures had strong and adequate reliability and discriminant validity.

Additional results of the multivariate test of the structural model are indicated in Table 4 and 5. Convergent validity can also be assessed by the completely standardized factor loadings and squared multiple correlations from confirmatory factor analysis as presented in Table 4. All of the factor loadings of the items in the research model are greater than 0.7, whereas all of the squared multiple correlations are greater than 0.5 [17]. As a consequence, all constructs in the model have adequate reliability and convergent validity. To sum up, the measurement model indicates adequate reliability, discriminant validity, and convergent validity. Table 5 shows the path coefficients, i.e. the standardized regression coefficients; meanwhile, the R^2 for each construct represents the amount of variance explained in compatibility and intention to use. Compatibility has the explained variance with 62%, and the model as a whole explained 57% of the variance ($p < .001$) in MHS acceptance, i.e. intention to use.

Table 4. Standardized factor loadings and individual item reliability

Item	Measure	Factor loading	R^2>0.5
TST1	A specific person (or group) is available for assistance with MHS difficulties.	0.75	0.56
TST2	Specialized instruction and education concerning software about MHS is available to me.	0.77	0.59
TST3	Specialized programs or consultant about training are available to me.	0.75	0.56
MS1	Management always supports and encourages the use of MHS for job related work.	0.84	0.71
MS2	Management provides most of the necessary help and resources to enable people to use MHS	0.88	0.77
MS3	Management provides good access to hardware/software resources when people need them.	0.83	0.69
Com1	Using MHS is compatible with most aspects of my work.	0.89	0.79
Com2	Using MHS fits well with the way I like to work.	0.94	0.88
Com3	Using MHS fits into my work style.	0.88	0.77
CSE1	I could complete the job using MHS if there was no one around to tell me what to do as I go.	0.86	0.74
CSE2	I could complete the job using MHS if I had never used a system like it before.	0.87	0.76
CSE3	I could complete the job using MHS if I had used similar system before this one to do the same job.	0.79	0.62
ITU1	I intend to use MHS in my practice as often as needed.	0.95	0.83
ITU2	Whenever possible, I intend to use MHS in my practice.	0.91	0.85
ITU3	I estimate that my chances of using MHS in my practice are frequent.	0.92	0.85

Figure 2 presents the significant structural relationship among the research variables and the standardized path coefficients. Most of the hypotheses were strongly supported except for hypothesis H4. Consistent with our hypothesis, the results indicates that compatibility has a significant effect on behavioral intention to use MHS (H1: γ= .56, p< .001) and computer self-efficacy also significantly direct effect on behavioral intention to use MHS (H2: β= .29, p< .01). This means that both compatibility and computer self-efficacy are important determinants of users' behavioral intent. The data also shows that technical support and training positively and directly influences computer self-efficacy (H3: γ= .76, p< .001) as well as has a significant indirect effect on intention to use. In contrast, management support effect on computer self-efficacy is not significant (H4).

Table 5. Standardized effects of constructs in MHS

Constructs	Computer self-efficacy(CSE)	Intention to use		
		Direct	Indirect	Total
Support and Training	0.76***		0.22**	0.22**
Management support	0.04		0.01	0.01
Compatibility		0.56***		0.56***
CSE		0.29**		0.29**
R^2	.62***	.57***		

Note. * p< .05; ** p< .01; *** p< .001

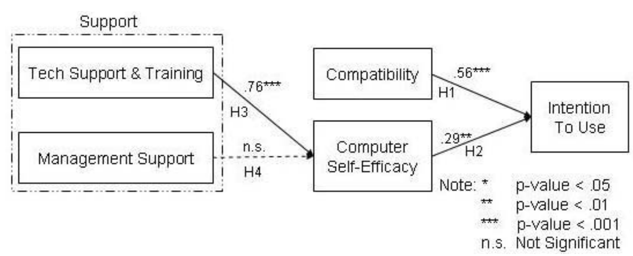

Figure 2. The empirical results of MHS

In sum, the tests of the structural model indicated that the compatibility has the strongest total effect on the intention to use, whereas neither direct nor indirect relationship was found between management support and intention to use. In the aspect of total effect, the computer self-efficacy as well as technical support and training moderately affect the behavioral intent. The results also demonstrate the importance of computer self-efficacy in mediating the relationship of the technical support and training on MHS acceptance (i.e. intention to use).

5. Discussions and conclusions

While individual's behavioral intent has been broadly used as an antecedent of technology acceptance in various domains, our study here focus on exploring the additional potential determinants of mobile health care system acceptance in health care setting, and examine the relationships between those variables and intention to use

MHS. As a consequence, we proposed a model that integrated the support (i.e. technical support and training, and management support), compatibility, and computer self-efficacy factors with behavioral intention to use to investigate what determine user MHS perception and acceptance.

The descriptive statistics indicated that the ratio of public hospitals (4) to private and juridical person hospitals (108) is ultimately small (approximately 0.04 only). We may infer that public hospitals indeed lag a lot behind private and juridical person hospitals in the implement and adoption of new IT/IS. This suggests that public hospitals need to enhance their capability of planning and implementing new technologies to strengthen their competitive advantage at faster pace. In addition, while the PACS is used most frequently among the response, the tablet PCs are the major mobile equipment used for MHS. These imply that physical size, weight, screen, or even electrical power and speed should be seriously considered while choosing suitable mobile devices in terms of gaining higher MHS acceptance.

The results provide initial insights into factors that are likely to be significant antecedents of planning and implementing mobile healthcare to enhance users' MHS acceptance. Consistent with our observations and prior literature, both compatibility and computer self-efficacy are significant antecedents of behavioral intent to use MHS. Yet, while the technical support and training have strong impact on computer self-efficacy, management support has no significant influence on computer self-efficacy. These are inconsistent with prior somewhat puzzling finding [9], which indicated that there is a negatively significant correlation between support and CSE.

However, our findings for technical support and training are supported by other studies. Consistent with our hypothesis (H3), the finding demonstrate that technical support and relative training programs will efficiently increase computer self-efficacy beliefs. This is also coherent with Hasan's study [20]. Horan et al. [23] pointed out the significance of staff training for implementing and using the online system in clinical practices. Furthermore, another study also suggested that technical related support and training significantly enhanced Internet self-efficacy [35]. Our findings are coherent with these studies and provide a valuable insight into MHS while mobile healthcare will be a significant potential tendency in the near future.

Contrary to the hypothesis 4, management support was found to have no significant effect on CSE which is inconsistent with literature. It means that there is no management support effect on those care professionals' behavioral intent to MHS adoptions. There are some significant practical considerations implied at this point. Firstly, the professionals' perceptions of management support are quiet weak. It seems reasonable to infer that either the organizations may not promote MHS aggressively and efficiently or there are some problems with the lack of satisfactions. The latter may comprise insufficient resources such as mobile equipments, potable systems, technology infrastructure, etc. Secondly, the goals and objectives of implementing MHS may not be clearly and adequately understood by each medical staff. Medical organizations must exactly and thoroughly educate their staff about the goals and advantages of implementing MHS. Insufficient comprehension will lower individual's intent to use new IT/IS and finally result in unsuccessful innovations adoption.

Consistent with prior studies [8, 23] and our hypothesis (H1), the findings illustrate that compatibility is the most important factor of new IT/IS acceptance in the context of mobile healthcare. This suggests that clinical medical processes must be taken into serious consideration while implementing new IT/IS in mobile healthcare. Only when participants have higher perceptions in compatibility with their previous or current practice processes, there is a higher possibility to achieve successful MHS acceptance.

This study has confirmed that the technical support and training not only have strong direct positive impact on CSE, but also have significantly indirect effect on behavioral intent to use MHS via CSE. Thus, CSE is an important mediating factor in implementing MHS acceptance. Given the appropriate technical support and training courses can raise individual's CSE perceptions and lead to great MHS adoption [20]. In other words, the availability of technical support and training in the healthcare organization are of crucial importance to MHS success. Sufficient and proper technical support and training will positively enable individuals to solve ambiguities surrounding the new IT/IS and strengthen computer self-efficacy of MHS usage.

There is increasing awareness of what benefits can be obtained from an IT investment in healthcare setting, such as improvement of care quality and patient satisfaction, decrease of clinical errors, as well as up-to-date patient and healthcare information. The explosion of mobile IT/IS in supporting health care and services has made it extremely important to understand the determinants essential to MHS acceptance by health care professionals.

Although this study provides interesting insights into the factors affecting the intention to use MHS, there are some limitations. Firstly, this study did not measure the change in user reactions over time because prior researches suggested that individual perceptions in compatibility and computer self-efficacy to behavioral intent may raise over time with increased system experience [9, 31, 32]. The introduction of new IT/IS will take time so it seems not reasonable to employ a new IT/IS and measure the effects immediately. Yet, our study provides useful insights into understanding determinants of implementing new MHS in the health care setting at this early stage. Secondly, the exposure of MHS is still in its infancy in Taiwan as well as the types and standards of MHS applications are still limited. Insufficient understanding of MHS and limited applications will lead to a lower user intention to use it.

Thirdly, this study was conducted via snowball and convenient sampling due to our specific subjects and low mail survey response rates from health care industry, addressed by Hikmet and Chen [21]. The phenomenon is resulted from their high professional autonomy and organizational policies. The challenge is the limitation and response rate in mail surveys from IT/IS users in the complicated health care industry. In addition, our subjects were those who used MHS as voluntary and self-reported measures. The sampling method employed here could have inadvertently introduced some selections bias in the choice of participants. Subject motivation may be a potential issue here as souvenir is a modest incentive. Therefore, our sample may not be fully representative of the entire population due to possible sample selection bias. However, self-reported measures have been viewed as a relative indicator.

Owing to resource constraints, while the findings of this study apply only to mobile healthcare setting, the generalizability of the findings to other industries needs to be examined in further study. Moreover, the proposed model variables explained 57% of the variance in behavioral intention to use the system, additional research is needed to explore extra significant antecedents of new IT/IS acceptance for mobile healthcare. Such as privacy and security issue, system and information quality, limitations of mobile devices (i.e. weight, size, electrical power requirements etc.); the above may be other interesting factors for implementing mobile healthcare.

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