

The Modified Technology Acceptance Model for Private Clinical Physicians: A Case Study in Malaysia, Penang

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Abstract

Malaysia's private clinic is wealth creator. To enhance its sustainable future, healthcare Information Technology (IT) change is inevitable. However, its' IT acceptance is limited. The past literatures showed physicians have different technology acceptance decision as compare to common users. Hence, understanding the physicians' technology acceptance is critical for technology management success. This study aims to gauge the factors influence technology acceptance decision among the physicians in Malaysia, Penang private clinics. Due to different trait of physicians, a modified Technology Acceptance Model has been proposed with seven independent variables: physician's attitude, perceived usefulness, perceived ease of use, IT vendor support, cost factor, training and education and social influence. Questionnaire was distributed to 350 registered private clinics under Penang Medical Practitioner Society. Total 189 questionnaires were returned and useable. Result of multiple regression analysis showed all the independent variables have a significant relationship with the physician's behavioral intention of IT usage. The proposed model fitness is confirmed with coefficient of determination (R^2) of 90.8%. The proposed model provides a platform to enhance understanding and direction to conceptualize the clinical physician's technology acceptance.

Keywords: Information Technology, Technology Acceptance Model, Private Clinic, Physician, Healthcare, Malaysia

1.0 Introduction

Today, the development of Information Technology (IT) has been promoted as the essential tool to shape Malaysia into a high income and productivity based country. Consequently, Malaysian IT spending is expected to grow up to US \$ 5.6 billion in the year 2013 ("Malaysia Information Technology Report Q1 2013," 2012). IT influences and interferes the entire Malaysian's lifestyle. Almost every day, human deal with IT, to surf internet, email or social

website Facebook, Twitter networking. As a result, IT adoption and usage has become a revolutionary force for every sector includes healthcare.

1.1 Malaysia Healthcare Industry

Malaysia's healthcare is a wealth creator. It is proliferated to gain global attendance and importance of promoting the health tourism. In year 2020, Malaysia's healthcare is aspired to achieve up to RM 50 billions of contributions towards the nation's economic (Performance Management and Delivery Unit (PEMANDU, 2011). Malaysia's healthcare system are divided into private and public sector. In the last decades, with the increasing of life expectancy, rapid growth of urbanization and rising of purchasing power, private sector development has become the main provider of primary care in Malaysia. In year 2012, there are 6589 private medical clinics (Health Facts, 2012) and the majority of these clinics are categorized as small medium enterprise (Sarlan, Ahmad, Wan Ahmad, & Dominic, 2011). It aims as the potential national key economic area to generate high income for the country in the Tenth Malaysian Plan.

Hence, private clinics are operating in a highly attention and competitive environment. According to Sarlan et al. (2011), since the majority of the private clinics are small medium enterprise and therefore, they have limited resources and manpower. Thus, the private clinic physicians are facing great pressure (Norazah, Chiam, & Norbayah, 2009). They received more intense competition with little room of service failure. Nowadays, patients are technology savvy. They are highly demanding for better service in a short waiting time and efficient scheduling appointment and medical record. All these demands burden the private physician. Almost every day, the physicians are struggling with the heavy volumes of clinical medical information, patient data loads, administrative tasks and demanding requirement of patients.

As a result, to improve the traditional healthcare system effectively, Malaysia's Ministry of Health (MOH) has encouraged computerizing the healthcare operation and implementing the paperless and e-health industry in the mid of nineties. MOH strive to provide high quality of healthcare environment and services with the means to promote and implement IT development in the hospitals and clinics.

1.2 Problem Statements

Malaysian private clinics are expected to bring significant contributions towards the country economic growth. Additionally, Malaysian government expected the IT implementation as a mean and strategic weapon to facilitate the daily communication, cost saving by extending the human capacity of knowledge, reduce time and space constraint and enhance the decision-making quality and process in the healthcare sector (Moores, 2012). Nevertheless, the adoption and acceptance of IT in Malaysia's healthcare still appear to be inadequate and not fully developing (Lee, Ramayah, & Zakaria, 2011). In the recent study of Sarlan et al. (2011) found that the utilization of IT in private clinics is limited. They are still using paper-based and manual system, even though there are basic computer facilities. As compared with other industries, the IT

acceptance in healthcare appears to be slow and far behind by 10-15 years (Wu, Wang & Lin, 2007; Gibb & Haar, 2009). The major reason for slow IT acceptance is due to the physicians (Esmailzadeh, Sambasivan, & Kumar, 2010). Many physicians feel uncomfortable and perceived that the IT changes are stressful and threatening as it changes the traditional practice behavior, pattern and communication way.

Keen (1991) agreed and stated, "It is always not the software issue but the human side of the implementation cycle which will block the systems to be used effectively" (p. 220). One of the major reasons lead to these failures is due to the inadequate knowledge and understanding of how and why individual or organizations adopt the technology (Giuse & Kuhn, 2003; Boonchai, Supasit, & Stuart, 2009). Hence, physician acceptance is increasingly a critical contributor to the IT success (Maarop & Win, 2012). However, to date, factors that drive the technology acceptance decision making of Malaysia's private clinical physician are still not clearly and fully identify (Yi, Jackson, Park, & Probst, 2006).

In Information System (IS) studies, several of theoretical technology acceptance prediction models have developed such as Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and Theory of Reasoned Action (TRA). Though, most prior studies underpin these frameworks only focused on the "common" users such as students and employees (Walter & Lopez, 2008). According to Chau and Hu (2002), a professional user like physician's technology acceptance prediction is different to the common IT user. Physicians work in a different working environment with higher requirements for their qualification, professionalism, ethical behavior, autonomous practice and professional responsibilities. As a result, they have dissimilar technology acceptance decision making and readiness. However, this issue does not receive a sufficient attention and focus.

Most of the past literatures only adopted TAM to examine the user's intention for technology acceptance. Walter and Lopez (2008) urged that TAM is a general model. It mainly focuses on common users. It might not completely fit to determine the healthcare physician's technology decision. Furthermore, the majority studies which adopted TAM in healthcare context have not used the external variables to enrich the research (Holden & Karsh, 2010; Melas, Zampetakis, Dimopoulou, & Moustakis, 2011). Given the current circumstances, a modified technology acceptance model specifically for Malaysian private clinical physicians is needed. Thus, to fill up the gap, the understanding of the IT acceptance in the private clinics and factors, which determine the private's physician IT acceptance, is sorely needed under the Malaysia context (Menon, Lee, & Eldenburg, 2000; Walter & Lopez, 2008;).

1.3 Research Objectives

Hence, this research study aims to explore the TAM model couple with several factors into individual, technological and implementation context to gauge the technology acceptance decision and readiness among the physicians in Penang clinical context.

Specific Objectives

- To examine the relationship between the physician's attitudes and their behavioral intention of IT usage.
- To test the relationship between the physician's perceived productivity of IT and their behavioral intention of IT usage.
- To identify the relationship between the physician's perceived ease of use and the behavioral intention of IT usage.
- To examine the relationship between the IT vendor support and the physician's behavioral intention of IT usage.
- To determine the relationship between the cost factor and the physician's behavioral intention of IT usage.
- To test the relationship between training and education and the physician's behavioral intention of IT usage.
- To identify the relationship between social influence and the physician's behavioral intention of IT usage.

1.4 Significance of Study

By the year of 2020, Malaysia aims to create a nation with A Healthy People, A Productive Society by focusing and providing an excellent healthcare service quality and system. With the proliferation of competition and the patient demand in the service quality, the IT implementation seems to be the promising method to provide an accessible, integrated, high quality and affordable healthcare system. It aims to reduce the burden of physicians. Unfortunately, the IT adoption in the healthcare is in a slow progress. According to Stone (2010), only 21% of the physicians in the United States adopt basic IT in the year 2010. Similar situation found in Malaysia (Sarlan et al., 2011) As a result, it is necessary to carry out the study to understand the readiness of physician technology acceptance.

In additions, many of the existing IS study mainly target on the common users such as management, employees or students in the business environment. As well, according to Zhang, Guo, and Chen (2007), it is suggested to focus on non-western countries in the IS study. Hence, from a theoretical perspective, this study will address the gaps and contribute to the IS existing researches with insight into diversified potential area. This study mainly focuses on the technology acceptance factor, which influence the Malaysia's private clinic physicians. The physicians consist of unique characteristics and obligations as compared to "common users". Besides, the major limitation of the TAM model is lack of consideration of external variables (Yarbrough & Smith, 2007; Holden & Karsh, 2010; Melas et al., 2011). To fill up the literature gap, this study included additional variables to examine the physician technology acceptance. Consequently, the findings attempts to provide broaden understanding and direction for physician's technology acceptance prediction in Malaysia private clinic setting.

For managerial standpoint, technology acceptance is always a fundamental challenge to the success of technology implementation. It is always a human effect, which cause the progress ineffective and inefficient. Knowing better for one's acceptance factor will enhance the success of IT implementation (Holden & Karsh, 2010; Maarop & Win, 2012). Thus, with the findings of this study, it advances the awareness to the physician and also the technology suppliers about the IT usage and readiness of the private clinic setting.

2.0 Literature Review

According to Lee et al. (2011), healthcare IT has become the commonly accepted umbrella term to define as application which store, collect, process, analyze, and share the healthcare information with the use of computer hardware, software, telecommunication devices. The success of health IT depend on the acceptance and participation of clinical physician. Thus, investigating the nature and determination factors that influence the IT adoption are deemed critical in both research and practical perspective. To develop the central concern of IT acceptance, a number of theoretical models have been developed such as TRA, TPB and TAM. Among the models, TAM has widely applied in the IS studies.

2.1 Theory of Reasoned Action (TRA) Model

TRA is the earliest proposed framework by Fishbein and Azjen (1975). This model was drawn from a social psychological aspect. It is concerned with the factors of consciously intended behaviors to explain a voluntary individual behavior. TRA model hypothesized two main determinants: attitude and subjective norms, which influence the behavioral intention and lead to adopt particular action. Attitude defined as the consequences of individual's judgment and feeling about the particular behavior. Whereas, subjective norm is the social pressure on other's perception towards the individual whether he should or should not perform the particular behavior (Fishbein & Azjen, 1975). It sometimes named social influence. They believed the attitude (personal factor) and subjective norm (social factor) have a significant relationship and cause an individual's intention to perform certain behaviors. TRA model is a fundamental intentional behavior study. It has been widely accepted and adopted in many aspects of behavioral studies include e-banking, internet stock trading (Rouibah, Ramayah, & May, 2009); healthcare (Khanna, Kavookjian, Scott, Kamal, & Miller, 2009; Pai & Huang, 2011).

Nevertheless, the assumptions and generality of the TRA model has been criticized. Sheppard, Hartwick, and Warshaw (1988) criticized that the target behavior in TRA might not completely under an individual volitional control and caused TRA's power of prediction limited. TRA omitted those behaviors, which is not voluntary or out of one's control. Furthermore, TRA model is only restricted to the measurement of a single behavior only but not the outcome of behavior. Therefore, without including the other external alternative of factors have become the major omissions in the TRA model (Ajzen & Fishbein, 1980). According to Blue (1995), TRA only suitable for behavior which is made in a conscious manner. To overcome the chief flaw in TRA model, TPB model proposed in the year 1985.

2.2 Theory of Planned Behavior (TPB) Model

TPB model is the extension of TRA model. To compensate the shortage exist in TRA theory, Ajzen (1985; 1991) proposed the TPB with incorporates an additional determinant named as “perceived behavioral control”. It is defined as one’s perception of their ability to perform a given behavior (Ajzen, 1991). In this model, attitude, subjective norms and perceived behavioral control are the determinants of one’s intention for a specific behavior. When one’s attitude and subjective norms are more favorable towards the specific behavior, it will enhance the perceived behavioral control to have the greater intention to perform such behavior (Gentry & Calantone, 2002; Lee et al., 2011). TPB theory has been widely applied in a wide range of IS studies such as prediction of on-line purchase, IT ethical behavior and social networking site usage (Shim, Mary Ann, Sherry, & Warrington, 2001; Baker & White, 2010;).

Conversely, several drawbacks of TPB were acknowledged. According to Sharma and Kanekar (2007), TPB omitted the external factors, which might influence the behavior intention such as demographic factors and caused limited in its prediction powers. Secondly, Ogden (2003) criticized the TPB model is only focused on the analytic truth that known by definition whereby it is not focused on synthetic truth- testing, observation and exploring. In additions, Mathieson, Peacock, and Chin (2001) also criticized the TPB’s construct might not be adequate for the entire contexts. The TPB’s constructs needed to customize in order to be fixed in different studies.

2.3 Technology Acceptance Model (TAM)

TAM was proposed by Davis in year 1989, which originated from TRA theory. It is mainly aimed for the motivation factors, which shape an individual intention to accept and use IT. TAM proposed two fundamental independent factors: Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU) to determine the technology acceptance intention. PEOU defined as “the degree to which user expects the target systems to be free of effort” and PU defined as “subjective probability that using the system will increase one’s performance” (Davis, Bagozzi, & Warshaw, 1989, p.985). TAM found when one’s believe that the ease of use and the usefulness of technology will lead to better behavioral intention to adopt such technology. Originally, attitude is included in TAM as a variable, yet later it was dropped due to the weak association towards the behavioral intention. In the past decade, TAM has been prevailing in research due to its simplicity, understandability and flexibility in various contexts (Wang, Wang, Lin, & Tang, 2003). According to Lee et al. (2011) and Mathieson et al. (2001), TAM is the most parsimonious model. Its’ variables and constructs might not need to re-operationalized even it is applied in different studies. It is well-organized model with high adoption in diverse studies such as healthcare information systems (Pai & Huang, 2011), social network (Liaquat & Anjali, 2009), educational setting (Teo, 2009; Teo, Lee, Chai, & Wong, 2009) and hotel (Kim, Lee, & Law, 2008). Among TRA, TPB and TAM, Gentry and Calantone’s (2002) study found TAM has the most superior impact to fit in explanation for behavioral intention with 81.1% variance.

Although TAM has been adopted and widely accepted to understand users' technology acceptance, it might not be ideal when evaluating for physician context. Aggelidis and Chatzoglou (2009) stressed that individual's characteristic is unique. Each individual is completely different from others as in a different environment, culture and organization. This is agreed by Chau and Hu (2002) and Hu, Chau, Sheng, and Tam (1999) studies. These studies found professional like physicians are different as compared with the other IT users. The findings found the physicians are more specific and pragmatic. They will emphasize more on perceived usefulness towards the technology to enhance their productivity as compare to the ease of use. Unfortunately, TAM is a general model, which target for the common user. The parsimonious nature of origin TAM is not designed specifically for health physician and therefore it might not completely fit into determination for the physicians' technology acceptance (Walter & Lopez, 2008; Holden & Karsh, 2010; Melas et al., 2011). Yarbrough and Smith (2007) also commented the major constraint of the TAM is lack of consideration of the external factors, which will influence the user's technology acceptance. It includes the lack of consideration for social factors such as social norms/influence in the TRA model (Legris, Ingham, & Collerette, 2003). As a result, there is a need to include other variables to extend and modify TAM theory in order to enhance its predictive power of technology adoption in the clinical context (Legris et al., 2003; Teo, 2009; Melas et al., 2011).

2.4 Modified Research Model for Clinical Physician

Upon review of the pros and cons in the previous theoretical models, Chau and Hu (2002) proposed a revised technology acceptance model by taking the consideration of the different roles of the physicians. This study targeted 421 public hospital physicians in Hong Kong to examine their acceptance towards telemedicine technology. Three contexts were proposed to examine physicians' technology acceptance, which include individual, technological and implementation context. The individual context mainly focused on the clinical physician's characteristic. Clinic physicians conceivably are more educated and their job function is much more complex than the general users. With the reason, it is important to understand the impact of physician's essential characteristic toward the technology acceptance (Yarbrough and Smith, 2007). On the other hand, technological context is to determine whether the perceived characteristic of the technology by physicians affect the technology acceptance. Chau and Hu (2009) suggested the two major variables in TAM: PEOU and PU as the constructs for technological perspective factors. However, in the findings, PEOU did not show any significant impact towards the behavioral intention. Lastly, the implementation perspective focuses on the environment setting where the IT takes place. According to Venkatesh, Morris, Davis, and Davis (2003), when there is a favorable environment setting to support and facilitate the IT usage, it enhances the user's technology acceptance.

Aggelidis and Chatzoglous (2009) adopted the suggested model from Chau and Hu (2002) with additional modification of constructs to examine the Health Information System (HIS) acceptance of Greek hospital personnel in the three contexts. The findings agreed with previous studies, which found that there is a need for the TAM model to be modified in order to provide better Goodness of fit result. Furthermore, with the revised model adopted in Chau and Hu

(2002) study, the findings showed it able to explain a high proportion of variance, which is more than 85% explanation power for healthcare personnel HIS acceptance.

3.0 RESEARCH METHODOLOGY

3.1 Proposed Conceptual Framework

Taking the suggestion from the previous literature suggestions and the theoretical framework of Chau and Hu (2002) study as the kernel, the proposed IT acceptance model for Malaysian clinical physician in this study was as in Fig. 1. With the proposed model, this study aims to investigate the factors, which influence the physicians' technology acceptance.

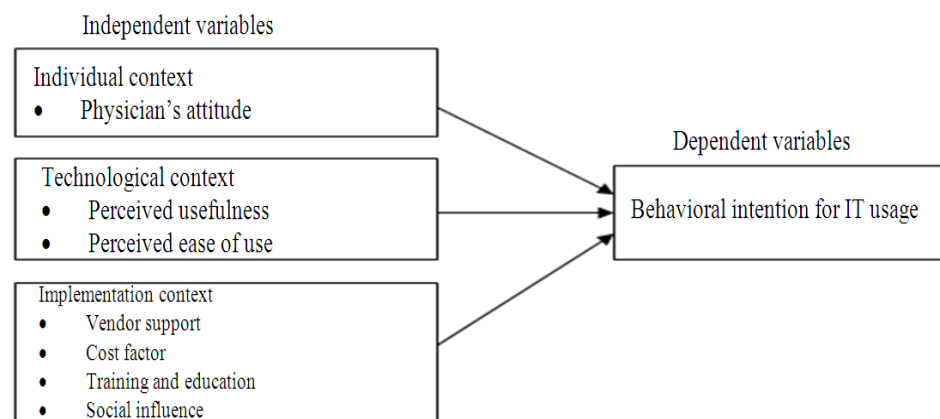


Fig. 1: Proposed modified technology acceptance model for clinical physicians

3.2 Dependent variable: Behavioral Intention for IT usage

In this research, the behavioral intention to adopt and use IT was chosen to be the dependent variable for theoretical and practical reason. Among the prior studies such as in TAM, TPB, and TRA studies, the behavioral intention is mainly adopted as the dependent variables. According to Fishbein and Azjen (1975), the best predictor of an individual's behavior is to measure his or her intention to perform the behavior. This is also supported by Chau and Hu (2002); Egea and Gonzalez (2011); Maarop and Win (2012). Furthermore, by using the behavioral intention as the dependent variable is to avoid the retrospective analysis and reduce down the response bias where the respondents might not able to recall their past adoption (Yi et al., 2006).

3.3 Independent variables

3.3.1 Individual context:

Physician's attitude: In the individual perspective, this study proposed to focus on physician's attitude. In the TRA model, attitude introduced as one of the important technology acceptance factors. It is defined as one's positive or negative feelings towards the IT usage

(Fishbein & Azjen, 1975). Hu et al. (1999) commented each user is unique and therefore, they might have different feeling and attitude towards the specific item. If the physicians aware and have a favorable feeling towards the technology, they will have enthusiasm to adopt the technology. Nevertheless, some researchers perceived attitude did not contribute towards the behavioral intention for IT adoption (Venkatesh & Davis, 1996; Venkatesh & Morris, 2000). Similarly, the TAM also excluded attitude in the theoretical structure (Davis et al., 1989). However, in the studies of Chau and Hu (2002); Taylor and Todd (1995); and Mathieson (1991), attitude is retained as a variable to influence the healthcare physician behavioral intention for IT acceptance. Researchers believed, when physicians have the positive attitudes towards the technology, it will lead them to have better commitment and enthusiasm towards the IT adoption (Chau & Hu, 2002; Aggelidis & Chatzoglou, 2009). As a result, the following hypothesis is tested as follows:

H1: There is a significant relationship between the physicians' attitude towards IT and the behavioral intention of IT usage.

3.3.2 Technological context

In terms of technological context, it aims to examine the physician's perception towards the technology characteristic. Moore and Benbasat (1991) suggested individual's perception towards technology is much more relevant and influential factor as compare to the technology attribute for technology acceptance decision. This study adopted the previous constructs proposed in TAM model, which are PU and PEOU. These constructs were also adopted in various studies includes Chau and Hu (2002); Aggelidis and Chatzoglous (2009).

Perceived Usefulness (PU): The use of PU to determine the behavioral intention has been in the limelight for most of the IT studies. It is defined as one's belief and perceived that the use of technology will increase his or her job productivity (Pai & Huang, 2011). It is closely linked with the performance expectancy under Venkatesh et al. (2003) study. From the past studies, PU is found as the most significant determinant of physician's behavioral intention to accept the technology (Chau & Hu, 2002; Yi et al., 2006; Tung, Chang, & Chou, 2008). If the physician perceived the use of technology would enhance their job performance and productivity, it will cause favorable towards the intention for technology adoption. Consistently, the hypothesis as follows is tested:

H2: There is a significant relationship between the Perceived Productivity and the physician's behavioral intention of IT usage.

Perceived Ease Of Use (PEOU): In the TAM model proposed by Davis et al., (1989), PEOU was also included as one of the important factors for behavioral intention to adopt the technology. It is defined as the degree of one's perception, which believes that the technology is easy to use and understand. When one believes the technology will be free of effort, it will increase the behavioral intention of individuals to adopt the technology (Teo, 2009; Lee et al., 2011). Due to the complex working environment and busy schedule, the physician will intent to adopt if they perceive the technology is easy to control, understand, flexible and convenient to learn and operate. However, there is an inconsistent finding in Chau and Hu (2002) study. In Chau's study,

PEOU do not have any direct significant impact towards the physician's behavioral intention for technology acceptance. The study explained it might due to the high learning capability for a professional and thus reduces the effect towards the technology acceptance decision. With this inconsistent result, this study aims to test again the following hypothesis under the private clinical context:

H3: There is a significant relationship between the physician's perceived ease of use and the behavioral intention of IT usage.

3.3.3 Implementation context:

In implementation context, the study focus on environmental setting where the technology takes place by examines the four factors as follows: IT vendor support, cost factor, training and education and lastly social influence.

IT vendor support: According to Walter and Lopez (2008), adopting and implementing technology will change the routine work of healthcare physician. Additionally, the private clinic might not have sufficient IT specialist. This has become one of the barriers for physicians reluctant to adopt the new system. If there is sufficient support from the organization and vendor, it leads to encourage the physician intent to adopt the technology (Ilgaria & Iivari, 1995). This is supported by Venkatesh et al., (2003) study, which perceived sufficient resources and technical support is essential factor to encourage the physician's intention to adopt the technology. As a result, the hypothesis was developed as follows:

H4: There is a significant relationship between the IT Vendor support and the physician's behavioral intention of IT usage.

Cost factor: Yarbrough and Smith (2007) stated that the cost factor has been largely omitted in the prior literature. Even though the IT adoption provides better service quality, enhances efficiency and effectiveness of clinical function, the investment cost for IT are expected to be costly. Furthermore, the private clinics are not fully subsidized by the government (Norazah et al., 2009) and the majority of them are small medium enterprise (Sarlan et al., 2011). Hence, the cost might be one of the factors for physicians to hesitate for IT acceptance. Cheong and Park (2005) study extends the TAM by adding in the perceived cost factor to examine the behavioral intention to use M-internet in Korea. The findings urged the importance of perceived cost to be included in the IT acceptance study. Perceived cost factor is defined as the perception towards the cost of investment of the necessary devices for the IT usage (Bertrand & Bouchard, 2008). If physician perceived that the benefit of IT able to out weight the cost of investment and they have sufficient financial resource to support, it will bring positive towards the intention to use and adopt the IT. However, this factor has received less attention in the past studies. The following hypothesis is proposed:

H5: There is a significant relationship between the Cost factor and the physicians' behavioral intention of IT usage.

Training and education: In the past studies, the training and education variable for physicians is seldom adopted in the technology acceptance model. However, according to Lee,

Kim, and Lee (1995), training and education are essential for technology acceptance. By providing system training and education program, it leads to better understanding of physician towards the system and enhancing the technology adoption and acceptance (Mohmood, Burn, & Gemoets, 2000). This is also supported by Zhang et al. (2007) study. Aggellidis and Chatzoglous (2009) study also proved that training and education as an important determinant to help users to have better knowledge towards the IT and thus enhance the positive intention to adopt it. Thus, this study proposed with sufficient of system's training and education program, it might influence the clinical physician to have better behavioral intention to adopt the IT systems.

H6: There is a significant relationship between the Training and Education and the physicians' behavioral intention of IT usage.

Social Influence (SI): SI is proposed in TRA and TPB model, however ignored in TAM. According to Fishbein and Azjen (1975), SI defined as one's perception that people who are important to him/ her think that he should or should not perform the specific behavior. It could be other individuals, peers, superiors, or the regulatory body's opinion. According to Yi et al., (2006), SI play an important role in determining the behavioral intention for IT acceptance. One learns and adopts the behavior when they observe the similar behavior adopted by others in the social group (Bandura, 1977 as cited in Yi et al., 2006). Therefore, the peer or others' recommendation could influence the physicians' behavioral intention and align their intention to adopt the technology. However, the past studies' results were mixed. In Chau and Hu (2002) findings, SI did not significantly contribute towards the physician's technology acceptance factor. It might due to the physicians have their own professionalism and independent decision making which reduce down the weight on other's influence. With the mixed result, it encourages this study to re-test the following hypothesis under the Malaysia private clinical perspective:

H7: There is a significant relationship between the Social Influence and the physicians' behavioral intention of IT usage.

3.4 Sampling Design and Data Collection Method

In the latest announcement of the Economic Transformation Program, Penang's healthcare has been included as part of potential area to transform Malaysia into high income country among the country. Yet, the IT adoption and acceptance of Penang private clinic appeared to be slow. As a result, the population for this study focused all private healthcare clinics in Penang, Malaysia that registered under Penang Medical Practitioner Society (PMPS). 350 registered private clinics found through the PMPS directory. The mail questionnaire survey method is employed to collect feedback from the key respondents in all these 350 clinics. The target respondents of this study were the qualified medical physicians which, holding the position as owner, partner in the private clinics as they have unique characteristic and accomplishment as compared to the common user. Furthermore, physicians have the control towards to acceptance or refusal of the technology. This study chosen the probability sampling technique where all elements within the population (registered private clinics under PMPS) are considered and have an equal chance to be selected (Sekaran, 2003).

3.5 Questionnaire Design

The collection data for this study is done through a mail questionnaire survey. The questionnaire consisted three parts. Part 1 included six questions, which used to collect the demographic information about the key respondents' clinics. It includes the clinic size, number of branches of your clinic, clinic ownership categories, decision maker for IT implementation, years of operations and annual patient visit. Part 2 focused on the constructs in each independent variable to examine the critical factors, which influence physician's behavioral intention towards the technology adoption. Twenty-six questions were used. Lastly, Part 3 focused on the dependent variable with total twenty-five items used to identify the physician's behavioral intention for the IT usage. For Part 2 and 3, 5 points Likert scale is used from range of (1) strongly disagree to (5) strongly agree.

3.5.1 Measurement

Most of the items, which used to operationalize the constructs, are developed from the past literature with minor and additional modification in order to fit in private clinical context. Table 1 showed the measurement for this study. All these items are measured using 5 points Likert scale ranged from (1) strongly disagree to (5) strongly agree.

Table 1: Constructs Measurement

Variables	Number of items	Source
<u>Individual context:</u>		
Physician's attitude	5	Taylor and Todd (1995)
<u>Technological Context</u>		
PU	5	Davis (1989)
PEOU	3	Davis (1993)
<u>Implementation Context</u>		
Vendor support	4	Igbaria and livari (1995)
Cost factors	3	Cheong and Park (2005)
Training and Education	2	Aggellidis and Chatzoglous (2009)
SI	4	Chau and Hu (2003)

3.5.2 Questionnaire administration

The questionnaires were sent to the secretary of PMPS in Penang, Malaysia. The questionnaires were then disseminated by secretary to the registered clinical physicians.

The questionnaires were given a duration of one month to be collected. The questionnaire attached together with a short cover letter indicates the research objective, guarantee of privacy for demographic information. In addition, a self- prepared return envelope was included to encourage the response rate and feedback from the physicians. Upon returned, 197 of

questionnaires were received with a 56.28 % response rate. All feedback was scanned through to avoid any missing data and error. However, eight questionnaires were found discarded due to the incomplete feedback. As a result, 189 of the questionnaires were useable. According to Hair, Black, Babin, and Anderson (2010), to achieve an adequate and meaningful estimation, the desired level for sample size should be in the parameter ratio of 20: 1. It means there must be 20 observations for each independent variable. In this study, the parameter ratio was 27: 1, which exceed the suggested ratio and therefore, the sample size for this study is considered adequate and accepted.

4.0 RESULTS

4.1 Internal Reliability Analysis

Table 2: Result of Reliability Analysis

Variables	Number of items	Cronbach Alpha
Behavioral intention of IT usage	25	0.8648
Physician's attitude	5	0.9445
PU	5	0.7548
PEOU	3	0.6866
IT Vendor support	4	0.7800
Cost Factor	3	0.7379
Training and education	2	0.8254
SI	4	0.9380

According to Hair et al., (2010), reliability is the degree of consistency and free of random error between multiple measurements of a variable. Reliability test needed to conduct to determine the stability and consistency of the construct measurement. To access the interim consistency reliability of the dependent and independent variables, Cronbach's Alpha was used. It is the most widely reliability coefficient test used to examine the reliability of multi-pointed scaled items (Sekaran, 2003). The results of reliability analysis were shown in the above Table 2.

As stated by Malhotra (2008), alpha coefficient which, falls below 0.6 are considered weak, within the range of 0.6-0.8 are moderately strong and above 0.8-1.0 are considered very strong in reliability. From the reliability result shown in the above Table 2. the internal reliability coefficient for the entire models is within the range of 0.6866 to highest coefficient 0.9445, which indicated that the reliability of all variables is moderately strong to very strong. Hence, it's able to conclude that all the items used to measure the DV and IVs are stable and reliable since they are consistent.

4.2 Multiple Regression Analysis

Multiple regression analysis is a statistical method to examine the relationship between multiple independent variables with one dependent variable (Hair et al., 2010). Therefore, it is adopted to examine the relationship between all the independent variables (physician's attitude, PU, PEOU, IT vendor support, cost factor, training and education and SI) and the

dependent variable (behavioral intention of IT usage). Prior to the hypothesis testing, the assumptions of multiple regression analysis are tested and met. Firstly, Ott and Longnecker (2001) suggested in order to avoid the multi-collinearity problem, all the variables' tolerance must be greater than 0.10 and its Variance Inflation Factor (VIF) must be lesser than 10. Furthermore, the residual scatter plots were conducted and showed the data is normally distributed (fall within the range of ± 3). This indicates that there is a statistically significant relationship between the independent variables and dependent variables. For the magnitude effect of the study, Cohen rules for the effect size are used. According to Cohen (1998), R^2 which fall within the range of 1.0-5.9 percent is considered as small effect size. Whereas, in the range between 5.9 till 13.8 percent is moderate and 13.8 percent and above is considered a large effect towards the study (as cited in Jitpaiboon & Rao, 2007). In this research, the coefficient of determination (R^2) showed in below Table 3 was 0.908. It means that 90.8% of the behavioral intention of IT usage can be explained by these seven independent variables. As a result, the effect size is considered large. In addition, the F-value showed in Table 3 below is 221.087 with the significant level of 1% (p -value = 0.000).

Table 3: Result of Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	Beta	Sig	Result
1 (constant)	4.205	0.051		0.000	
Physician's Attitude	0.139	0.034	0.450	0.000**	Accept
PU	0.599	0.031	1.242	0.000**	Accept
PEOU	0.161	0.027	0.385	0.000**	Accept
IT Vendor Support	0.226	0.030	0.486	0.000**	Accept
Cost Factor	0.199	0.025	0.522	0.000**	Accept
Training and Education	0.102	0.015	0.331	0.000**	Accept
SI	0.381	0.038	0.566	0.000**	Accept
R^2	0.908				
Adjusted R^2	0.904				
Sig. F	0.000				
F-value	221.087				

Notes: ** p -value < 0.01 (two-tailed)

It indicates that the fitness of the proposed model is confirmed. As depicted in Table 3, all the independent variables : physician's attitude ($\beta = 0.139$ with $p < 0.01$); PU ($\beta = 0.599$, $p < 0.01$); PEOU ($\beta = 0.161$ with $p < 0.01$); IT vendor support ($\beta = 0.226$ with $p < 0.01$); Cost factor ($\beta = 0.199$ with $p < 0.01$); training and education ($\beta = 0.102$ with $p < 0.01$); and SI ($\beta = 0.381$ with $p < 0.01$) were found to have a significant relationship with the behavioral intention of IT usage. Hence, all the hypotheses H1, H2, H3, H4, H5, H6 and H7 were supported.

The technology is a promising method to enhance the quality, productivity for every organization. Yet, in the healthcare context, the usage of technology is still lagging behind. From the prior literatures, it is always commented healthcare physician has a different technology acceptance decision as compare to the users in different sectors. As a result, this study aimed to understand and identify the relationship with the behavioral intention of Penang clinical physicians in IT usage.

Under the individual context, physicians' attitude was found to have significant relationship with the technology acceptance intention. This finding is consistent with prior studies (Fishbein & Ajzen, 1975; Chau & Hu, 2002; Teo, 2009; Aggelidis & Chatzoglou, 2009). The result revealed that forming physician positive attitude towards technology is important. By having a favorable feeling and attitude towards the technology, the clinical physician would have better intention to use and adopt it. The finding agreed with Chau and Hu (2002), which attitude should be retained in the technology acceptance model for clinical physicians.

Evidently, based on the results shown, PU has also proven to have a direct significant relationship with the behavioral intention to use. This result is similar to the many scholar's findings, Yi et al., (2006); Tung *et al.*, (2008); Aggelidis and Chatzoglou (2009). In addition, based on the β value showed in Table 3, PU ($\beta = 0.599$) has the most significant relationship with the physician behavioral intention of IT usage. When juxtaposed with Chau and Hu (2002) study, surprisingly the similar finding on PU was found. PU was found to be the most significant factor for physician's intention to accept and use the technology. As a result, it showed that the private clinical physician is hard headed. They will emphasize the practical usage and productivity of technology before the adoption. It is convinced that the physicians will intent to use the IT if the technology able to showed the improvement, the productivity to enhance the performance for the clinic.

In terms of PEOU factor, there was a mixed result in the past literature. In the TAM proposed by Davis et al., (1989), PEOU is perceived as one of the significant determinant for technology acceptance. According to Teo (2009), when the user believes the technology is being free of effort, this will increase the one's intention to use and adopt. Yet, Chau and Hu (2002) disagree. In their study, to examine the Hong Kong physician technology acceptance intention and PEOU showed to have an insignificant effect towards the intention. The researchers explained physicians are highly educated and have advance learning capability compared to the other users. They would not adopt the technology just because the system is easy to control and use. In our findings, it is surprisingly found an inconsistent result with Chau and Hu (2002). The result revealed that, when the physician perceived the technology easy to understand and use, it will raise up the intention for them to use it. This is mainly due to the heavy and the busy daily workload of the physician in private clinic. Furthermore, it is consistent with the evidence found in Sarlan et al. (2011). The majority of private clinics IT users' computer literacy is in the beginning stage. Therefore, the physician will rather choose those technologies, which easy to use, understand and operate which able to reduce down their burden. The complexity of IT will prohibit the physicians to adopt and use the technology.

Hence, PEOU is able to bring a significant influence towards the physician's intention to use the technology.

In this study, IT vendor support also proven to have significant contribution towards the physician's intention to use and accept the technology. New technology implementation will change the routine work environment and practice of physicians. This arises stress and cause anxiety for users. Furthermore, the private clinics are lack of IT specialist. With limited or no support from organization or vendors, it is a barrier for physicians to use the technology (Teo, 2009; Sarlan et al., 2011). If the organization or vendors of technology able provide sufficient assistance and guidelines towards the users, it will reduce down the user's anxiety, stress and increase the physician's confidence to use the technology. As a result, this finding is consistent with Ibgaria and Iivari (1995) and Venkatesh et al. (2003). Sufficient vendor support is an important indicator of the technology acceptance.

The cost factor is often omitted in the past literature for technology acceptance prediction. The reason of excludes the cost in technology adoption prediction might due to the work setting. According to Yarbrough and Smith (2007), the cost factor mainly based on the particular healthcare setting whether the cost of IT investment is financed. The subjects, which targeted in this study, are based on private clinic's physician. In Malaysia, the public healthcare sectors are mainly subsidized by government but not the private clinic (Norazah et al., 2009). Additionally, the majority of private clinics is small and medium size of enterprise (Sarlan et al., 2011). As the result, this study attempt to include the cost factor to examine its influence towards the technology usage intention. The result revealed that the cost factor is a significant determinant of technology acceptance. This result agrees with Cheong and Park (2005) study. There is a need to include the cost factor into the literature. The physician will definitely reject to adopt the technology if they perceive that the benefit of technology does not out weight the investment cost or the clinic does not have sufficient financial support to implement the technology.

In the past literature, the training variable was normally used as the moderating factor in the technology acceptance model. However, Mohmood et al. (2000) suggested the training factor should be treated as an independent variable to predict the users' intention to use since the importance of training for IT success has been widely documented. Aggellidis and Chatzoglous (2009) also agreed and thus included training as an independent determinant for technology use. Hence, the result found to be significant. With the suggestion given, this study included the training variable to test its relationship with the physician technology acceptance. The result showed training and education program would significantly relate to the physician's intention to use. By providing sufficient technology-specific training and education program will assist the physician to have a better understanding and thus reduce down the anxiety and it will lead to better intention for the physician technology acceptance and adoption.

According to Fishbein and Azjen (1975), others' opinion such as workmates, regulatory bodies, competitors or customers could influence the individual's intention to use. SI plays a crucial role in technology adoption decision. However, mixed results found. In Chau and Hu

(2002) study commented SI will affect the physician's decision-making but not towards the profound significance extent. They stated that the physicians are highly educated and have independent thinking. As a result, the SI was found to be less weight to influence the physician's technology acceptance decision. Based on the result shown in Table 3, SI was shown to have a significant relationship with the user intention for technology usage in the private clinical setting. This was inconsistent with Chau and Hu (2002) finding. However, it is consistent with the studies of Aggellidis and Chatzoglous (2009) and Yi *et al.* (2006). The major reason might due to the highly competitive environment in private clinical setting. In order to be the top service provider, private clinic physicians are required to be highly alert towards the peers, customers and experts' advice or the competitor information. All these suggestions will definitely influence their decision-making. Bandera (1977) stated, an individual will learn and adopted the similar behavior of others through the observation (as cited in Yi et al., 2006). The result of this finding concluded the private clinical physicians are willing to accept others' recommendation and interaction towards the technology adoption.

5.0 DISCUSSION

5.1 Theoretical Implications

The past studies mainly adopted TAM model, to explain the PU and PEOU towards the user technology prediction. Although TAM has proven its ability to predict the technology acceptance among the users, it might be different in healthcare context. Physicians have a different job context, autonomy, ethics and obligation compare to the common user. They might have a different technology acceptance decision. Hence, the original TAM might not fully capture the determinants for physician technology acceptance. In our study, we modified the origin TAM framework. Beyond the PU and PEOU, we have added in attitude, IT vendor support, cost factor, training and education and lastly SI. All these variables then categorized into individual, technological and implementation context. The findings showed the proposed model is significant and fix with a total 90.8% of explanatory power by all these seven variables. From a theoretical point of view, our proposed model may contribute to the body of literature and it represented a new perspective to enhance understanding towards the conceptualization of technology acceptance by clinical physician.

In addition, this study also contributes towards the IT literature by focusing the private clinical setting rather than the public sector. These two settings are different. Hospitals setting is mainly subsidized by the government of the country. However, the private clinics, which focus on our study, are mainly financed by individual physician and categorized as small and medium enterprise. Due to this different setting, we added in the cost factor as the independent variable to predict the clinical physician technology acceptance. The findings showed to be significant. Cost is part of the prediction, which will influence the physician's intention to use. Our empirical finding urged the importance of cost factor in technology adoption prediction especially in the private practice setting. It is needed to be introduced and include in the technology acceptance prediction.

5.2 Managerial Implications

Healthcare sector is a rapidly growing sector and national wealth creator. Nowadays, the human's demographic change, life expectancy increase, lifestyle disease and purchasing power arise, therefore a demand for better healthcare service in a fast and effective way, e-medical record dramatically raises. IT seems to be the strategic weapon aid in satisfying these entire requests. However, the adoptions and acceptance of IT in healthcare are noticeably lagging behind. It is important to take note; physician plays a crucial role in deciding the technology adoption in the private clinic setting. As a result, physician technology acceptance is essential to be understood.

For practitioners like management or the IT vendor and suppliers, this research provided sufficient guidelines on the factors, which essential to boost up the technology acceptance. Firstly, among the factors, it showed the PU is the most significant prediction. As a result, it revealed the clinical physicians are more focused on the usefulness of the IT product to enhance their job productivity. With this finding, practitioners should emphasize more information on the usefulness and benefit to adopt IT product in term of the communication, advertising or demonstration.

Secondly, the second factor, which influences the physician's intention to use the technology, is SI. This provided a signal to the practitioners whereby the clinical physicians are willing to interact and consider the expert opinion in their technology decision. Hence, information session like talk, seminar or conference by inviting the IT expertise or clinical practitioner and peers to share their experience and to highlight the benefit of the technology products should be conducted. All these expert opinions might influence the physician to adopt and acceptance the technology. Besides, our findings also suggested that it is essential for the management to encourage a positive attitude towards the technology in order to boost up the physician's intention to use the technology.

The major barrier of physician to accept the technology is they are lack of knowledge of the technology and the complexity of IT. Physicians do not familiar with the IT product and perceived the new technology implementation might be too complex to use and will change the physician's daily work practice. This will lead to stress and anxiety and cause physician hesitate to use the technology. The finding of this research, suggested that sufficient vendor support should be given towards the users. It is believed that by giving sufficient support, physician will tend to be more understood and secure towards the technology and lead to better intention to adopt and accept it. IT product suppliers and vendors should provide continuous support such as hotline service, warranty service and manual book to reduce down the physician's anxiety and lead to better intention to adopt the technology. Beyond this, technology-specific training and education programmed have been empirically proven in this research to be essential for physician technology prediction. Pre and during training or course should be implemented to enhance the physician IT products' knowledge, so that they will more understand the product and more likely to have positive intention to use it and adopt it. Besides, by implementing the training programmed towards the physician will reduce down their anxiety and increase the

PEOU by giving the experience for them to use the IT. PEOU also found to be a significant factor to determine the physician technology decision.

Furthermore, due to the study focused on the private clinical setting, the cost is empirically proven as a significant prediction towards the physician technology acceptance. As a result, the IT suppliers must consider the price issue when promoting and encourage the IT adoption. If the physicians perceived the investment cost is too expensive and it might not be out weighted by the benefit, they will refuse to adopt and accept the technology. In such a case, the policy maker and the government might need to consider this cost factor in the private setting. It could be the reason why IT adoption in a private clinical setting is lagging behind.

5.3 Research Limitations and Recommendation

It is almost to be impossible to conduct a research without any limitation. Although the sample size in this research is adequate and acceptable, the generalizability of the research may be still limited. The study only focused on the physicians in the Penang private clinical context. The finding might not able to represent the overall Malaysia's healthcare sector. To overcome generalizability limitation, the future research might need to consider the private clinics in whole Malaysia. Secondly, this study only examines the effect of the seven independent variables towards the physicians' behavioral intention of IT usage by multiple regression analysis. It might omit the possibility of a causal relationship between the independent variables and the consideration of moderating variables. Thus, future research might need to adopt Structural Equation Modeling (SEM) analysis to examine also the causal relationship among the independent variables and add in the moderating variable to predict the technology acceptance in order to provide broader and in-depth prediction.

Lastly, the behavioral intention of IT usage has been used as the proxy to represent the actual technology usage. Even though, the behavioral intention is well recognized as the suitable proxy, this may weakened down the entire explanatory power of the model. The future study might need to consider the weakness of using the behavioral intention as the proxy for actual usage.

6.0 Conclusion

IT become the integral part in every sector includes the clinical sector. Understanding the technology acceptance is essential, as the user acceptance is the determinant for a successful IT. This research combined the two variables in TAM (PU and PEOU) together with additional external factors, total seven variables used to examine the influence towards the clinical physicians' behavioral intention to use the IT. TAM is a well-recognized and developed theory. Nevertheless, a solely TAM might not able to predict fully the clinical physician technology acceptance. The opportunities still exist for research to introduce additional variables to enhance the prediction power of TAM in varied context. The proposed model by this study, all seven variables attitude, PU, PEOU, IT vendor support, cost factor, training and education, SI were found to have a significant relationship with the private clinical physician's behavioral intention of IT usage. In addition, the

proposed model showed as a significant model to predict technology acceptance for physician in Malaysia's private clinics.

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