

## User acceptance of personal health records in Malaysia: pilot test

Aceptación del usuario de registros de salud personales en Malasia: prueba piloto

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### ABSTRACT

The importance of Personal health record (PHRs) can be illustrated from its ability to improve information exchange among the patients, physicians, and healthcare service providers. PHRs enroll the patients directly to their health decision making through giving them the authority to control and share their health information. The user acceptance of PHRs is a vital issue. A combination of UTAUT2 and PMT models is going to be tested in this study in order to test the user acceptance of PHRs in Malaysia in the future. This paper involves the pilot testing of the proposed model in order to find out its validity and reliability using Smart PLS.

**Keywords:** PHRs; Personal Health Record; User Acceptance; UTAUT2; PMT; Malaysia; Pilot Test.

### RESUMEN

La importancia de los registros personales de salud (PHR) puede ilustrarse por su capacidad para mejorar el intercambio de información entre los pacientes, los médicos y los proveedores de servicios de salud. Los PHR inscriben a los pacientes directamente en la toma de decisiones de salud dándoles la autoridad de controlar y compartir su información de salud. La aceptación de los usuarios de las PHRs es una cuestión vital. Una combinación de los modelos UTAUT2 y PMT se va a probar en este estudio para comprobar la aceptación de los usuarios de PHR en Malasia en el futuro. Este trabajo implica la prueba piloto del modelo propuesto para averiguar su validez y fiabilidad usando Smart PLS.

**Palabras clave:** PHRs; Registro de salud personal; Aceptación de usuario; UTAUT2; PMT; Malasia; Prueba piloto.

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## 1- INTRODUCTION

Medical information is stored in an electronic form in many countries nowadays. Several forms are used to store this information. The most common forms of storing the medical information are Electronic Health Records (EHRs), Medical Health Records (EMRs), and Personal Health Records (PHRs). This study focuses on the user acceptance of PHRs. PHRs are personally created and maintained health records in which patient can store, update, and share his medical information with their doctors or healthcare providers in a manner that user friendly and private. In PHRs patients have the

ability to store a variety of information such as name, address, weight, medical history, allergic status, medicine history, lab tests results, and more (Agrawal, 2010) (Barlow, Crawford, & Lansky, 2008) (Cruickshank, 2012) (Daglish E, 2013) (Demiris, 2012). Along the previous years, many definitions has been given to PHRs, the reason for that was the abilities offered by each PHRs system at those years (Miller H.D, Yasnoff W.A, & H.A, 2009). Many institution such as Markle Foundation, the National Alliance for Health Care Technology (NAHIT), the American Health Information Management Association (AHIMA) have given a different definition and addressed the importance and the wide adoption of PHRs in the globe (Jeongeun, 2011).

As one of the newest systems that has been introduced, PHRs have many benefits to the patients, doctors, and healthcare providers. The most important feature offered by the PHRs is the enrollment of the patients to make decisions related to their health condition. Another feature is the ability to share patients' medical information with their physicians or healthcare providers (Kumar, Sharanie, & Jaspaljeet, 2015). In the case of switching between two doctors for example; using PHRs to share the patient's health information will save a lot of time and procedures. Saving time and cost would be very beneficial for a wide segment of people, many studies has mentioned each or both time and cost (Cruickshank, 2012) (Cronin, 2012) (Bulajic, Stamatovic, & Cvetanovic, 2012) (Azliza, Ariffin, Yunus, & Embi, 2008) (Kumar et al., 2015) (Studeny & Coustasse, 2014) (Vance, Tomblin, Studney, & Coustasse, 2015) (Calvin et al., n.d.) (Majedi, 2014) (Barlow et al., 2008) (Syed-mohamad, Ali, & Mathusin, 2010) (Jeongeun, 2011) (Görlitz, 2013) (Richards, 2012). On the other hand, in some cases, PHRs may save life. In a disaster for example, the paramedic team would save a life in case they could reach the medical history of an injured person in time. Many studies such as (Profile, Situation, Program, & Benefits, 2011) (Laugesen, 2013) (Ponnudurai, 2010) (Agrawal, 2010) have addressed the importance of PHRs in saving lives. Another issue has been mentioned by (Bliemel & Hassanein, 2006) that described the lack of information provided by the patients to their physicians. This lack might be a result of many reasons such as: the time offered by the physicians in some cases may not be enough for the patients to revile all the information required, another possible scenario is that the patient may forget to tell the physicians about or hide some information or symptoms (Bliemel & Hassanein, 2006). In both scenarios PHRs could help the patients to provide all the required information to their physicians since that the patients will have enough time to upgrade their medical information using PHRs. For all the previously mentioned reasons, PHRs are very useful tool that enhance the information exchange between the physicians and their patients, PHRs also enhance the physician to patient relationship.

## 2- Issues to be Discussed While and Before Adopting PHRs

The important characteristics of PHR; the ability to access medical information, the ability to modify medical information, and the information sharing have been reviling many concerns regarding to the ease of use, privacy, and user attitude toward this technology. The ease of use is a significant issue especially to those elderly people who do not have good experience with technology. Privacy on the other hand has a significant influence on patient decision since they might not have a clear vision about the level of security applied in such technologies, and the laws that guarantee their rights to be secured and to their information to be private. The user acceptance of the technology is a key to success; investigating the user acceptance and behavioral intention toward new technology can be considered as a critical issue. Testing the user acceptance of PHR in certain society may revile the future of the interaction with this technology and prevent certain problems that the technology may face in the future.

## 3- User Acceptance Theory

Testing the user acceptance for a specific product or technology can be considered as a critical aspect in deciding the future of this technology (Venkatesh, Davis, & Morris, 2007). In order to test the user acceptance of technology, a list of questions should be introduced to the respondents in order to build our vision according to their responses. Each list of questions is usually based on a specific model which have been introduced in order to describe certain factors. Along the previous years, there are a variety of models that have been described some factors that affect the user acceptance of technology. (Davis, Bagozzi, & Warshaw, 1989) introduced the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA) (Fishbein & Azjen, 1975), Theory of Planned Behavior (TPB) which can be considered as one of the first theories that described the behavioral intention toward technology (Ajzen, 1991), Innovation Diffusion Theory (IDT) (E. M. Rogers, 1995), and many other models.

### A. Unified theory of acceptance and use of technology (UTAUT)

As mentioned before, many models and theories have been introduced over the previous decades. Each and every theory described a unique factor at least. (Venkatesh, Morris, Davis, & Fred Davis., 2003) introduced Unified

Theory of Acceptance and Use of Technology (UTAUT) as a unification of eight previous models. In total, UTAUT built on for major factors which are Performance Expectancy (PE) which describes the degree of benefit gained by an individual while using certain technology, Effort Expectancy (EE) describes the ease of use of a certain technology by an individual, Social Influence (SI) which describes the effective motivation by others (family, friends, or colleagues) to an individual intended to use certain technology, and Facilitating Conditions (FC) which describes the facilities available which may support the use of the new technology by an individual (Venkatesh et al., 2003). According to (Venkatesh, Thong, & Xu, 2012) UTAUT succeed to explain almost 70 percent of the disparity in behavioral intention to use certain technologies and about 50 percent of the disparity in the use of technology. Since its introduction in 2003, UTAUT has been used widely in many research fields; alone, extended, or as a combination with other models(Chang, 2012).

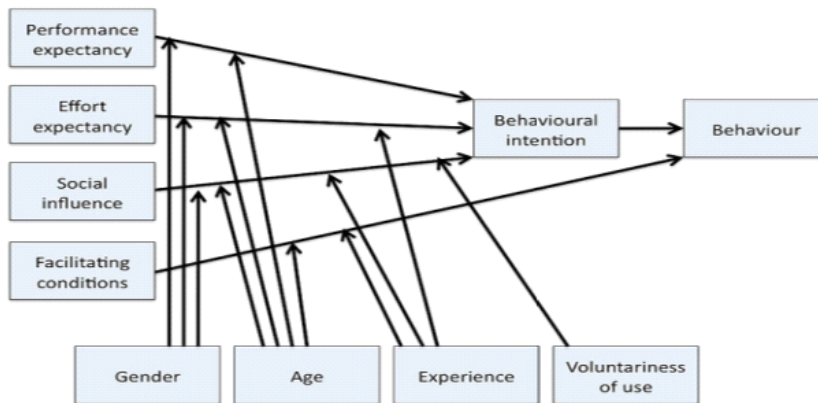
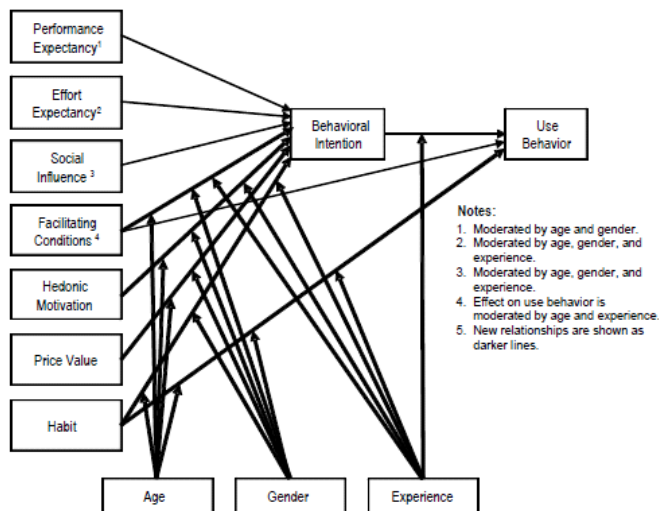


Figure 1. UTAUT

B. UTAUT2

According to (Chang, 2012) UTAUT has been widely used in various discipline. Despite the global success of UTAUT in describing and explaining the behavioral intention to use a new technology, (Venkatesh et al., 2012) upgraded UTAUT into UTAUT2 by adding three important factors as described by the authors. First, Price Value (PV) which describes the effect of the technology cost on the user who is willing to use it. Cost generally affects on our decisions in buying goods, technologies, or services. Second, Hedonic Motivation (HM) which describes whether the user is enjoying a certain technology or not. Generally, people tend to reuse technologies, goods, or services they have enjoyed. Third, Habit (HT) which describes the habitual behavior of the user of the new technology; being used to use similar technologies will motivate an individual to use the new technology. HT can be considered as one of the most significant factor in predicting the use of the technology in the near future. However, the three added factors showed an obvious success since that UTAUT2 has been widely applied in many research fields, except a noticeable lack in using this model in health information technology field (Alazzam et al., 2015).



- Notes:
1. Moderated by age and gender.
  2. Moderated by age, gender, and experience.
  3. Moderated by age, gender, and experience.
  4. Effect on use behavior is moderated by age and experience.
  5. New relationships are shown as darker lines.

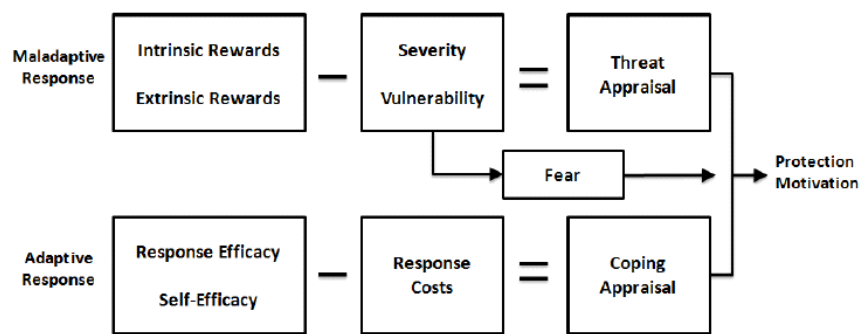
Figure 2. UTAUT2

### C. Protection Motivation Theory

PMT was originally introduced by (R. W. Rogers, 1975) based on the Health Belief Model. Due to early limitation noticed in PMT, (Maddux & Rogers, 1983) redesigned PMT in a way that fix these limitations. Over the previous years, PMT has been applied widely as a framework to predict the adoption of health related behavior in many previous research studies (Milne, Sheeran, & Orbell, 2000). PMT can be considered as a universal model to be used in predicting the health behavioral intention. In addition, PMT premised on cost-benefit analysis which can be considered as a significant aspect (Prentice-Dunn & Rogers, 1986). However, in a comparison study held by (Seydel, Taal, & Wiegman, 1990) PMT proven that its abilities to predict the health behavior goes stages beyond the abilities of Health Belief Model (HBM). PMT can be applied to any threat situation away from its being health issue or another issue (Prentice-Dunn & Rogers, 1986). All these evidences drive any researcher to involve PMT in any research.

PMT generally consist of two major variables which are Threat Appraisal and Coping Appraisal. Threat appraisal focuses on the source of the pain or the threat which causes the fear to the individual and the likelihood of this threat to be happen in real life. Coping appraisal focuses on the way or the decision made by the individual to deal with this kind of threat. The outcome of these two appraisals will be the Protection Motivation. Protection motivation focuses on the individual intention to perform an upcoming behavior (Sun, Wang, Guo, & Peng, 2013).

Coping appraisal can be either maladaptive or adaptive response. Maladaptive response reflects the individual intention to continue a specific behavior despite the warning of containing a specific threat such as continuing smoking. Adaptive response reflects the individual intention to follow the warning and stop a specific behavior such as quitting smoking. Figure illustrates the PMT components.



(Source: Floyd, et al., 2000)

Figure 3. PMT

### D. Privacy

Privacy is known as the ability of control and use of someone's personal information (Liu, Marchewka, Lu, & Yu, 2004). The ability of controlling over information is a critical aspect that have been discussed by many researchers in various disciplines such as law, information systems, marketing, and social sciences (Hann, Hui, Lee, & Png, 2002)(Acquisti et al., 2014). Another definition of privacy is the right given to an individual to control his information sharing and exchange (Collste, 2008); the individual has the right to decide what information, when, why, and how would it be reviled to any other person or organization (Yee, Korba, & Song, 2006).

Over the previous years, many researchers expressed their concerns regarding to privacy in many fields such as business where the customers' information is being collected for decades and the introduction of information technology led to increasing of these concerns (Liu et al., 2004). On the other hand there is noticeable increment in employing IT in healthcare field which led to new concerns regarding to the patients' privacy(Fung & Paynter, 2006); PHRs for example as a website might be a target for hackers and viruses which may violate the privacy of patients. Internet provide a variety of services that can help healthcare provider to introduce their services to their customers. Some of these services violate the privacy of the patients such as tracking. On the other hand, healthcare providers developed their web-sites in a way that asks the customers to provide their personal information. These information must be used for a specific purpose and must not be reviled to any unauthorized person or organization (Goldman & Hudson, 2000). Therefore, the research on privacy is attracting healthcare providers to introduce the best to their customers

A considerable attention has been paid to the privacy over the previous years in many research studies. It is probably correct to say that the privacy is the most discussed issue along the past decades by the information and communication technology (ICT) ethicists (Kezer, Sevi, Cemalcilar, & Baruh, 2016).

### E. Proposed Model

The availability of computers and information technologies in organizations is growing. The use of information technology in organization exceeded 50% of the total investments (Westland & Clark, 1999). In order to achieve higher productivity from the technologies used, they must be accepted in any environment. User acceptance toward new technology has been considered as one of the most mature research areas by many authors (Hu, Chau, Liu Sheng, & Tam, 1999). The researches held in this area since over than two decades has reviled a variety of models and theories which is aiming to describe the user acceptance toward new technology (Venkatesh et al., 2003).

The findings of our review have shown that Technology Acceptance Model was the most desirable model in the PHRs user acceptance research studies. From eight experimental studies six were using either TAM or a combination of TAM and other models or extensions. Whereas UTAUT used twice only in PHRs user acceptance research (Mamra et al., 2017). In order to decide the best model among the three; TAM, UTAUT, Proposed Model, a comparison has to be done in order to find out which model covers more factors than the other.

Table 1. Comparison

Factors	TAM	UTAUT	Proposed Model
Performance Expectancy	Available	Available	Available
Effort Expectancy	Available	Available	Available
Social Influence	Available	Available	Available
Facilitate Conditions	Missing	Available	Available
Price Value	Missing	Missing	Available
Hedonic Motivation	Missing	Missing	Available
Habit	Missing	Missing	Available
Threat Appraisal	Missing	Missing	Available
Coping Appraisal	Missing	Missing	Available
Privacy	Missing	Missing	Available

This comparison shows that the proposed model can cover more factors than the previous used models. Practically, analyzing the proposed model will revile the real effectiveness of the proposed model.

#### 4- Sample Size

In order to find out the effectiveness of the model practically, a survey is distributed to the targeted sample size. Deciding the number of the required participants must be done through reviewing the related books and papers. According to (Hill, 1998) the required sample size should be 10 as a minimum and 30 as a maximum number of participants. (Belle, 2008) suggested 12 as a minimum number of participants in pilot studies. According to (Connelly, 2008) the number of pilot studies participants should be 10 percent of the total number of survey participants; which means if the target sample size for the study is 250 then the required sample size for the pilot test is 25 participant. (Hartzog, 2008) suggested that the number of participants in a pilot study should be between 10 and 30 participants. (Julious, 2005) recommended that a minimum number of 12 participants should be taken into considerations in any pilot study. In conclusion, and since that the targeted sample size for the survey is 250 participants, a number of 25 participants is going to be needed in this study in order to test the proposed model.

#### 5- Hypothesis

According to (Mamra et al., 2017) TAM was the most used model to investigate the user acceptance of healthcare information technology, whereas UTAUT came in the second position which has been used in two studies. In order to predict the behavioral intention to use PHRs in Malaysia, UTAUT2 has been proposed as the main model which has a high percentage of predicting the behavioral intention to use certain technology. In order to improve the prediction of behavioral intention, Fear Appraisal, Coping Appraisal, and Privacy have been added to the UTAUT2. However, the components of UTAUT2 is supposed to have a positive impact on the behavioral intention to use PHRs in Malaysia. Fear Appraisal will lead to the Coping Appraisal which has a positive impact on the behavioral intention to use PHRs in Malaysia. Privacy on the other hand might be the only factor that has a negative impact on the behavioral intention to adopt PHRs by the individuals in Malaysia.

#### 6- Pilot test

Pilot test can be considered as a very useful and important tool to check the reliability of the questionnaires before starting the data collection process (Hartzog, 2008)(Thabane, Ma, & Chu, 2010). As mentioned in the Sample Size section, the number needed for respondents is 25. Thus, a survey has been distributed to 37 respondents to reach the number 25. Targeted sample size was the students and the staff of UTeM (Universiti Teknikal Malaysia Melaka). The reason behind choosing this sample size is; the knowledge related to surveys and questionnaires

among the students and the staff. On the other hand, the difficulty to collect data from the people at the hospitals due to the lack of cooperation from these hospitals. In addition to that, PHRs has been introduced and adopted in order to serve any human away from being sick or healthy (Kim, 2012) (Ponnudurai, 2010). Another reason is that students are more engaged with the new technologies and mobile applications, and some forms of PHRs are available nowadays as applications such as Apple Health and Samsung Health.

#### 7- Pilot Test Structure

The pilot test in this study is structured into three main categories. First, some information about PHRs are listed as an introduction to the survey, and some contact information and ethical statements. Second, respondents are required to fill some information about their age, gender, marital status, education level, and so on. Finally, a group of 64 statements that represent the survey questions. The 64 questions are built as a likert scale. Respondents need to give their impression regarding to each statement as the following: -

- I do not know
- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree
- I do not want to answer this question

The answers are written in a way that helps the respondents to answer the questions without getting confused. The answers from 1 to 5 can be considered as common answers to the most distributed surveys in nowadays. Option number 0 has been added to the survey to give the respondents the choice to inform the author that they have no idea about the meaning of the statement or their impression. On the other hand, and as an ethical procedure, respondents have the right to choose answer 6 if they are not willing to answer a specific question. However, the numbering procedure is not an important issue in analyzing likert scale since that; likert scale is an ordinal scale and the numbers appeared are actually ratings, not numbers (Norman, 2010).

Table 2. Frequencies

No.	Statements						Frequencies % (Ratings)						
	1	2	3	4	5	6							
1-	I used to use the Internet for different purposes						4	0	0	8	40	48	0
2-	I used to use online applications on my phone or laptop						0	0	0	8	31	60	0
3-	I used to keep a copy of my medical information						8	0	12	44	16	20	0
4-	I used to share my health information online if its required						8	28	12	28	20	4	0
5-	Using PHR to contact doctors will help me to manage my health condition easily						4	0	8	8	60	20	0
6-	Using PHR to contact the doctor online will save time and cost						0	4	8	8	52	28	0
7-	Asking perceptions from doctor online will be helpful						0	4	8	24	56	8	0
8-	Using PHR applications to store my medical information will help me to manage my health condition						0	0	8	16	56	20	0
9-	Having my medical history in the electronic form may save my life in case of emergency						0	0	4	12	48	36	0
10-	It will be easy for me to update my health information online						0	4	4	24	44	24	0
11-	It will be easy to book appointments online						0	0	8	12	44	36	0
12-	It will be easier to access my medical lab tests results online						0	0	4	8	52	36	0
13-	Buying medicine online will be easy and free of efforts						0	4	0	24	40	32	0
14-	I will find it easy to use PHR in website form or application form						0	0	0	24	64	12	0
15-	Using PHR to get advises online will be useful and free of efforts						0	0	0	32	48	20	0
16-	It is easy to use mobile applications such as PHR						0	4	0	8	52	36	0
17-	It is easy for me to use laptops to surf PHR websites						0	0	4	12	56	28	0
18-	The Internet is available for me						0	0	0	8	56	36	0
19-	It is easy to use USB based PHR						4	0	4	16	60	16	0

20-	It is easy to print my lab tests using a printer	8	0	4	20	40	28	0
21-	It is easy to have my health information on a CD or DVD	0	8	8	32	36	16	0
22-	I can use the Internet at home	0	0	0	4	40	56	0
23-	I can use the Internet at work	0	0	0	8	48	44	0
24-	I can use the Internet at net-café	0	0	0	20	44	36	0
25-	I have the skills to use the Internet for different purposes	0	0	4	4	52	40	0
26-	I think I would be able to use PHR in my daily life	0	0	0	12	52	36	0
27-	People who I trust would advise me to have a copy of my health information	0	0	8	16	64	12	0
28-	People who inspire me would advise me to contact the doctor online	0	0	8	28	48	16	0
29-	People who I trust would advise me to update my health information personally	0	0	4	24	52	20	0
30-	People who inspire me would advise me to adopt Personal Health Record	0	4	4	28	56	8	0
31-	I enjoy surfing the Internet	0	0	4	8	32	56	0
32-	I enjoy using mobile applications	0	0	0	8	36	56	0
33-	I enjoy emailing	0	0	8	10	44	28	0
34-	I would enjoy surfing my health information online	0	0	8	10	60	12	0
35-	I would enjoy collecting my lab tests results online	0	0	8	16	48	28	0
36-	I would enjoy using PHR to do many health activities	0	0	0	36	40	24	0
37-	I used to buy online services and products at fair prices	0	0	8	16	44	32	0
38-	I would buy a life time PHR at a reasonable price	0	4	8	36	40	12	0
39-	I would buy a yearly licensed PHR at a reasonable price	0	12	8	28	40	12	0
40-	Price value is important for me	0	0	0	4	40	56	0
41-	My health condition is important for me	0	0	0	0	28	68	4
42-	I have concerns about having any health issues	0	0	4	4	32	60	0
43-	Being healthy is important thing for me	0	0	0	4	28	68	0
44-	Having any health issue will be a source of stress for me	0	4	0	8	28	60	0
45-	I am afraid to feel that me health condition is at risk	0	0	0	4	44	52	0
46-	I am worried of having any health issue which may become complex in the future	0	0	0	4	44	52	0
47-	Using Online health services may help me to manage my health condition	0	0	4	8	48	40	0
48-	My health condition could be improved if I self-manage it using PHR	0	0	0	24	64	12	0
49-	Using PHR could have the potential to help me to control my health condition	0	4	0	12	68	16	0
50-	I feel that self-management using PHR to manage my health condition could have a positive impact on my health	0	0	0	24	52	20	4
51-	I think that I would use PHR if there is someone around who would help me to use it	0	0	0	24	60	16	0
52-	I believe I could use PHR if I can call someone for help if I got stuck	0	0	0	20	54	26	0
53-	I believe I could use PHR if I have enough time to learn it	0	4	0	32	40	24	0
54-	I have concerns about my privacy while using PHR	0	0	0	16	28	56	0
55-	I can share my health information only with the people I trust	0	0	4	4	32	60	0
56-	I do not reveal my personal information on the Internet	0	0	8	0	36	56	0
57-	I am concerned when providing my credit card information online	0	4	4	4	24	64	0
58-	I am concerned about the privacy of my medical history	0	0	0	12	36	52	0
59-	I have the Intention to contact doctors online	0	0	0	24	32	40	4
60-	I have the intention to view my lab tests online	0	0	4	16	40	36	0
61-	I have the Intention to ask for prescriptions online	0	8	4	24	44	16	0
62-	I have the Intention to share my personal health information with trusted doctors online	0	0	0	24	48	24	4
63-	I have the intention to keep a copy of my medical history	0	0	4	16	44	36	0
64-	Overall, I have the intention to adopt PHR	0	4	0	28	40	28	0

As shown in table 2, the majority of the participants have a high intention to adopt PHR. Some participants have disagreed with some points but they still willing to adopt PHR. This disagreement may not be actually a disagreement to the point, participants may think that they are breaking the law in some cases e.g. question number 61 (I have the intention to ask for prescriptions online). On the other hand, a high percentage of the participants have chosen (Neutral) to answer the question number 3 (I used to keep a copy of my medical history), whereas they have chosen either (Agree) or (Strongly Agree) to answer the question number 64 (Overall, I have the intention to adopt PHR) which means that the question number 3 is not actually affecting on their intention to adopt PHR. In a result, this question will be kept or removed after reviewing the expert judgment report.

Some participants have provided their feedback after disagreeing with some statement. For example, some participants have disagreed with question number 21 (It is easy to have my health information on a CD or DVD) and commented that they would prefer the copy on pen drives (USB based PHR). This question also will either be removed or kept according to the expert judgement report.

This survey also shows that the additional factors such as Fear Appraisal, Copping Appraisal, and Privacy have an important effectiveness on the behavioral intention to adopt PHR among the participants.

Few participants have decided to choose either "I do not know" or "I do not want to answer this question" which actually shows that the questions were clear enough and do not cause any embarrassment to the participants

Overall, this pilot test shows that the majority of the participants have a high intention to adopt PHR despite being neutral or disagreeing with some questions.

#### 8- Data Analysis

Partial Least Squares (PLS) analysis was employed to test the hypotheses. Nonparametric bootstrapping (Wetzels et al., 2009) with 2,000 replications was applied. PLS techniques was used as PLS is most suitable if the research purpose prediction or exploratory modelling (Garson, 2016). This study also aims to explore the factors influencing the user acceptance of PHRs in Malaysia. As such, PLS is appropriate technique for this study. PLS incorporates a two-stage procedure. The research model encompasses of two sub-models namely, UTAUT2 and PMT is to estimate the structural model (Garson, 2016).

#### 9- Results

##### A- Profile of Respondents

The results reveal that the sex of the respondents was (60%) for males and (40%) for females. The respondents are generally in the middle age as mostly belonged to the two sets of 38-43 years old, which represents (40%) and 44-49 that represent (33.3%). Almost three-quarters of the respondents have a degree while only (16.7%) have finished a primary or secondary level. Furthermore, the majority of the respondents were married, however only (13.3%) were single.

##### B- Measurement Model

The constructs were examined in terms of reliability and validity. The reliability and validity of the research instrument and measurement model were examined by identifying the internal consistency, convergent validity and discriminant validity. According to (Hair et al., 2014) convergent validity is confirmed when items load highly (greater than 0.5), constructs have an Average Variance Extracted (AVE) of at least 0.5, and Composite Reliability (CR) measures of internal consistency reliability is above 0.7. Table (3) illustrates the results of (CR) for each latent variable, are higher than 0.7, which satisfies the rule of thumb proposed by (Hair et al., 2014). The reliability of individual indicators was tested. According to (Hair et al., 2014), outer loading above 0.5 is considered significant and the item should be remain. However, items with outer loading below 0.5 should be removed from the scale with condition that the removed item does not decrease the average variance extracted value. Table (3) shows that all loadings are more than 0.5, which satisfies the rule of thumb suggested by (Hair et al., 2014). The (AVE) was used to evaluate the convergent validity. The acceptable value for AVE is 0.5 or above, meaning the latent variable proposes at least 50% of the variance from its scale items. Nevertheless, when the value is less than 0.5, it means that there is more error and the latent variables do not reveal the underlying factors of the respective latent variable. (Hair et al., 2014). Table (3), shows that all AVE values are more than 0.5, which indicate that the convergent validity of these constructs was satisfactory (Fornell and Larcker, 1981).

Table 3. Evaluation of Measurement Model

Construct	Number of Items	Factor Loading (>0.5)	CR (>0.7)	AVE (>0.5)
Coping Appraisal (CA)	4	0.649-0.981	0.865	0.624
Effort Expectancy (EE)	4	0.674-0.848	0.846	0.580
Facilitate Condition (FC)	4	0.607-0.853	0.862	0.614



Habit (H)	4	0.836-0.899	0.921	0.744
Hedonic Motivation (HM)	4	0.567-0.893	0.841	0.578
Privacy (P)	2	0.942-0.970	0.809	0.915
Performance Expectancy (PE)	4	0.648-0.936	0.955	0.729
Price Value (PV)	4	0.614-0.860	0.914	0.552
Social Influence(SI)	2	0.840-0.912	0.829	0.769
Threat Appraisal (TA)	6	0.640-0.852	0.869	0.539
Intention to Use (IU)	4	0.646-0.804	0.809	0.517

Note: CR: Composite Reliability; AVE: Average Variance Extracted

According to (Hensler et al., 2015), Heterotrait-monotrate (HTMT) ratio is an adequate method for the assessment of the discriminant validity. As per Hensler et al. (2015) HTMT value below 0.85, indicate that the discriminant validity has been set up between a given pair of a reflective construct. Table (4 shows that all HTMT values are lesser than 0.85, hence, the results in the Heterotrait correlations confirm that there is discriminant validity.

Table 4. Heterotrait-Monotrait Ratio (HTMT)

	CA	EE	FC	H	HM	P	PE	PV	SI	TA
CA										
EE	0.169									
FC	0.411	0.498								
H	0.247	0.195	0.263							
HM	0.312	0.294	0.246	0.219						
P	0.152	0.314	0.321	0.460	0.357					
PE	0.483	0.193	0.390	0.450	0.122	0.236				
PV	0.272	0.698	0.740	0.241	0.163	0.465	0.399			
SI	0.420	0.274	0.385	0.264	0.268	0.372	0.389	0.264		
TA	0.104	0.279	0.297	0.226	0.196	0.326	0.167	0.117	0.178	

### Conclusion

Understanding the acceptance and intentional to use the PHRs is very important aspect which may revile the future of interaction between the users and the PHRs. This study is the first stage in building a new model based on UTAUT2 model with the addition of PMT model and privacy as new factors that may affect the intention to use PHRs in Malaysia. The result shows that the reliability and validity test of the new model were successful. Based on this result, the model is going to be sent to be validated by the experts in order to be used on higher population.

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