EXPLORATIVE STUDY ON THE USERS 'ATTITUDES TOWARD "RAMA APP"
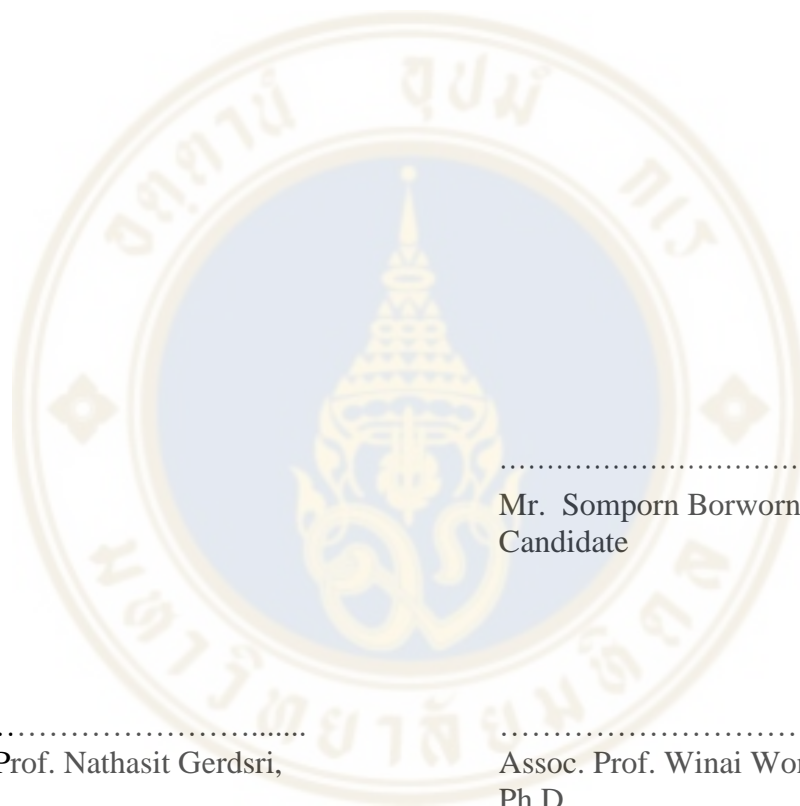
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**EXPLORATIVE STUDY ON THE USERS 'ATTITUDES TOWARD
"RAMA APP"**

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ABSTRACT

In Thailand, a variety of mHealth applications have been developed to assist people who use their mobile phone to improve their health, such as one developed by Ramathibodi Hospital, Thailand's leading medical school, to help their patients flow more smoothly through the outpatient hospital process called "Rama App." which include features like online registration, pharmacy queuing, appointment management, and online payment, etc. However, because the hospital has a poor user acceptance rate, knowing what users think of the Rama App is critical in assisting application developers and executives in focusing on the proper areas for improvement.

From June to August 2021, a qualitative study incorporating semi-structured interviews with 30 current Rama App users was done. The guided question in the survey was created using constructs from selected technology acceptance models that the author believes are appropriate to apply in the Rama App context. Finally, the author discovered similar attitudes about Rama App, encouraging and discouraging components for its adoption, and a Mental Model on Rama App Acceptance based on the qualitative investigation, which will assist Rama App's future development and research.

KEY WORDS: Rama App/ mHealth/ Technology acceptance/ mobile application/
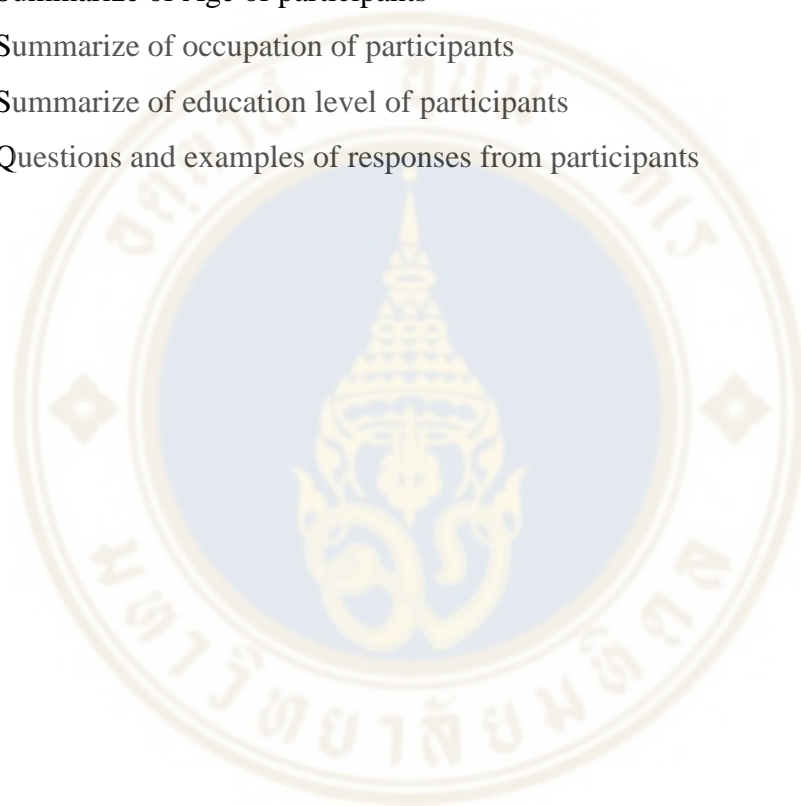   user attitude

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CHAPTER I
INTRODUCTION

Today's technological advancements in mobile applications make life easier than ever before by speeding up and automating our daily routines through a variety of programs that can be downloaded from the internet. The number of people using mobile phones in Thailand is increasing, according to a household information technology and communication survey conducted by Thailand's national statistical office in 2020, which revealed that 60.5 million of Thailand's 63.8 million people over the age of 6 own a mobile phone (94.8 percent) which 86.4% of them using smartphone as their primary device. Furthermore, 49.7 million individuals (77.8%) utilize the internet in their daily life, up from 60.8 percent in 2019 and 66.7 percent in 2020.(National Statistical Office Ministry of Digital Economy and Soceity of Thailand, 2021)

The healthcare industry also benefits from these technological advancements by incorporating the use of mobile phones and the internet to promote communication, patient monitoring, outpatient process management and clinical knowledge reference for physicians, which is referred to as mHealth(Free et al., 2010). Many hospitals in Thailand, both private and public, have developed their own mobile applications for a variety of reasons, such as automating administrative, doctor appointments, hospital queue management, or cashless payment, consultation, telemedicine, doctor referral, wayfinding, and emergency care.

Ramathibodi Hospital, a supra-tertiary university hospital in Bangkok, Thailand, which serves over 500,000 outpatient visits per year, has created a patient portal application called "Rama App" that includes many functions such as online hospital registration, online new medical record for new patients, online appointment management, telemedicine, pharmacy and cashier queue management and providing general health knowledge to patients. The primary goal of developing the mobile application is to improve service quality by transitioning from a manual to a computerized process that can reduce human errors and be much faster which ultimately

contributes to the hospital's goal of promoting patient safety. The extent to which Rama App has an impact on service quality is directly proportional to the number of patients who use the application. However, according to hospital statistics, only 30% of scheduled outpatient visits use Rama App in the registration process. Despite efforts to continuously improve the application function through the Rama App hospital committee, which was mostly based on meeting feedback, Rama App usage has not increased significantly in recent years. To increase utilization, it is critical to understand the primary motivator that influences the intention to use the Rama App. To date, no formal research has been conducted on end-user (patients) attitudes and acceptance of the Rama App; thus, The author intends to conduct research to investigate attitudes towards the Rama App and the factor(s) associated with its adoption by incorporating a discussion of the Technology Acceptance Model (TAM), one of the most widely used models in evaluating technology acceptance and providing insight into user intentions and behavior, as well as other variables that have been studied in related previous researches. In order to gain as much as possible insights of users, the author employed a qualitative approach by conducting a semi structured interview with Ramathibodi patients who currently use Rama App. This study will aid Ramathibodi hospital application developers and executives by revealing the true insights of Rama's App users, which will be used as a guide to establish policies that will increase the adoption of and provide greater value to Ramathibodi patients in the future.
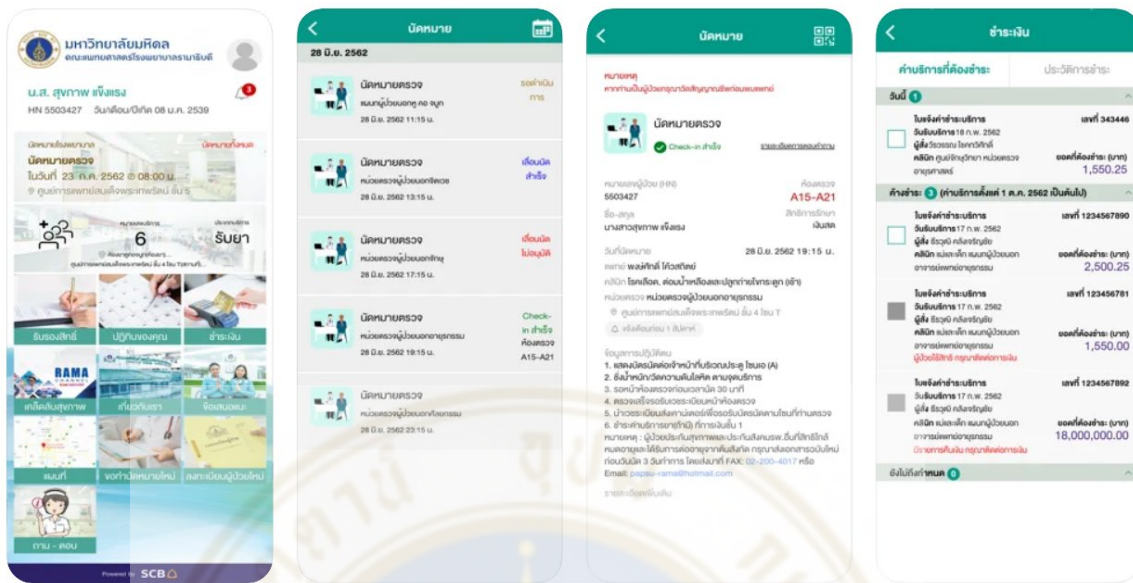
Figure 1.1 Rama App screenshot

CHAPTER II
LITERATURE REVIEW

2.1 Theory of Reasoned Action (TRA)

In 1975, Fishbein and Azjen proposed the TRA model. The theory explains the relationship between beliefs, attitudes, intentions, and behavior by stating the direct determinant of a person's actual behavior is the behavioral intention which is a function of 2 variables including Attitude toward behavior and Subjective norms. To clarify, attitude toward behavior is a user's favorable or negative attitude towards using a certain technology whereas subjective norm is defined as "a person's perception that most people who are important to him think he should or should not perform the behavior in question"(Fishbein & Ajzen, 1975). The linkage among the constructs in TRA are shown in Figure 2.1.
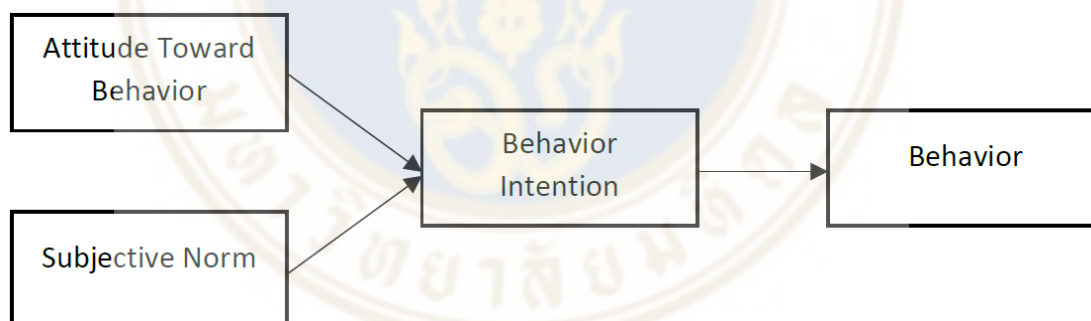
Figure 2.1 Theory of Reasoned Action (Fishbein and Azjen,1975)

2.2 Technology Acceptance Model. (TAM)

In 1989, Davis introduced Technology Acceptance Model (TAM) to predict the use and acceptance of information systems and technology among individuals. TAM is one of the most widely cited studies in the field of technology acceptance; according to Google Scholar, the original study "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology" has been cited over 60,000 times.

The model proposed two key variables in the model that positively influence attitude toward using the system, namely perceived usefulness (PU) and perceived ease of use (PEOU); Both variables have an effect on the creation of a user's attitude toward using an information system. A good attitude will lead to the desire to use the information system (or behavioral intention to use) and, eventually, to its actual use (Davis, 1989) as shown in Figure 2.2.

The original definition of Perceived Usefulness (PU) is refers to "the degree to which a person believes that using a particular system would enhance his or her job performance" whereas Perceived Ease of Use (PEOU) is refers to "the degree to which a person believes that using a particular system would be free of effort"(Davis, 1989)

Users are compelled to adopt an application depending on how well it performs its functions and how tough or easy it is to get it to do so. Furthermore, Davis discovered that PU has a much stronger correlation with usage than PEOU with usage implying that "users are often willing to cope with some difficulty of use in a system that provides critically needed functionality"(Davis, 1989). In addition, ease of use alone cannot compensate for a system that does not provide any usefulness to them. Moreover, if the system is really valuable but users do not perceive it to be so, they are unlikely to utilize it; on the other hand, users may underrate the system based on their perceptions.
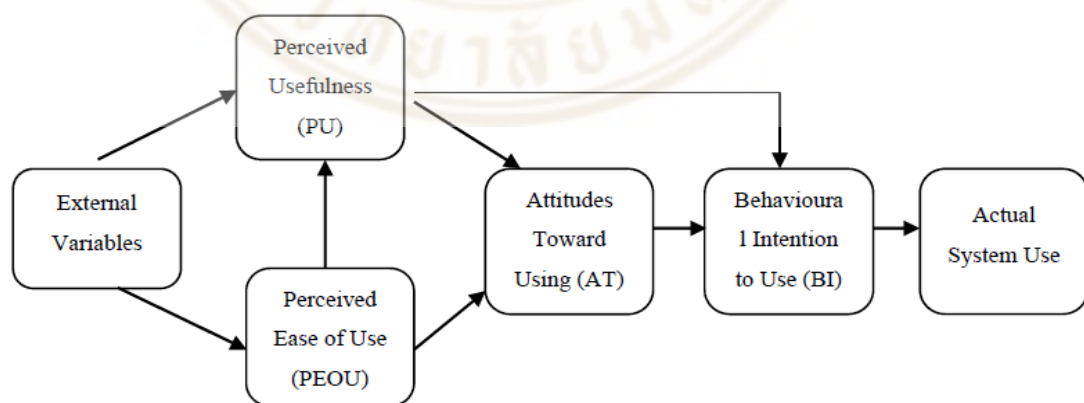
Figure 2.2 Technology Acceptance Model (Davis, 1989)

2.3 Unified Theory of Acceptance and Use of Technology. (UTAUT)

In 2003 Venkatesh et al. launched a model known as UTAUT model that integrates alternative perspectives on user and innovation acceptance from eight competing technology acceptance models, including the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), and the Theory of Planned Behavior (TPB), a model that combines the Technology Acceptance Model and the Theory of Planned Behavior (C-TAM-TPB), Social Cognitive Theory(SCT) and the Innovation Diffusion Theory (IDT). In UTAUT, the four theoretical constructs serve as surrogates for drivers of intention to use or usage behavior including performance expectancy, effort expectancy, social influence and facilitating conditions. In addition to these variables, the theory also considers moderating variables such as gender, age, experience, and voluntariness of use, which influence the relationships between various variables and behavioral intentions (Venkatesh, Morris, Davis, & Davis, 2003) as shown in Figure 2.3.
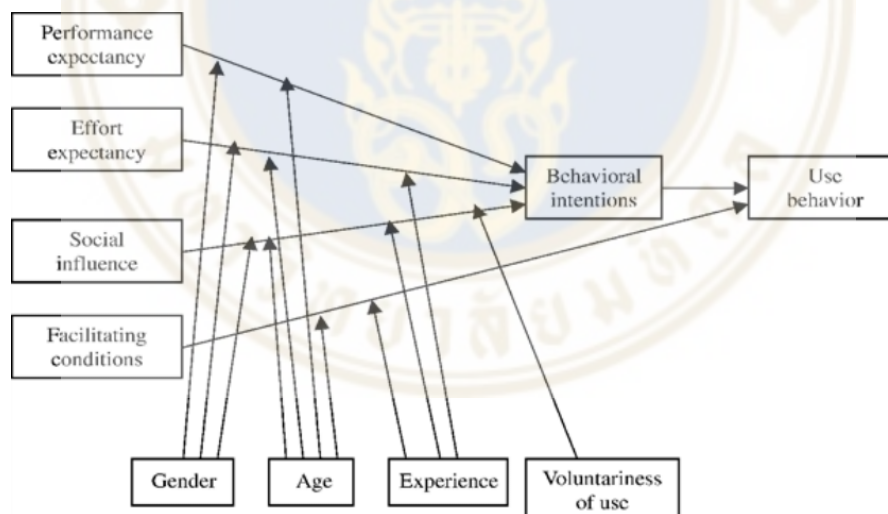
Figure 2.3 Unified theory of acceptance and use of technology (UTAUT)
(Venkatesh et al., 2003)

2.4 mHealth

The improvement of communication technology and the widespread use of mobile phones is increasing at a rapid rate nowadays. Furthermore, the network's sophisticated infrastructure allows for faster data transmission, enabling individuals to communicate smoothly via audio and video at a reasonable cost. The healthcare sector has also benefited from the mobile phone revolution, which has evolved into m-health. M-health is defined by the Global Observatory for eHealth of the World Health Organization as "medical and public health practice assisted by mobile technology, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices"(W. H. O. Global Observatory for eHealth, 2011). In 2009 survey; WHO classified M-Health into 6 categories as follows

1. Communication between individuals and health services
   - Health call centers/Health care telephone help line
   - Emergency toll-free telephone services
2. Communication between health services and individuals
   - Treatment compliance
   - Appointment reminders
   - Community mobilization
   - Awareness raising over health issues
3. Consultation between health care professional
   - Mobile telemedicine
4. Intersectoral communication in emergencies
   - Emergencies
5. Health monitoring and surveillance
   - Mobile surveys (surveys by mobile phone)
   - Surveillance
   - Patient monitoring
6. Access to information for health care professionals at point of care
   - Information and decision support systems
   - Patient records

Current evidence suggested that deploying mHealth can help a variety of stakeholders. Incorporating mHealth into treatment and monitoring clinical data in

patients, particularly those with chronic diseases like cardiac arrhythmia, obesity, diabetes, or hypertension, has shown encouraging effects. In addition to patients, mHealth has a significant impact on healthcare workers such as physicians, nurses, and technicians, especially in terms of information access, as they can access to evidence-based material while treating patients; additionally, mHealth benefits health workforces in terms of promoting better communication, for example, by assisting cross-departmental consultations or prioritizing tasks. In terms of cost savings, several researchers believe that mHealth can lower healthcare costs by streamlining processes and reducing healthcare providers' usual workload. Details of evidence are shown in Table 2.1.

Table 2.1 Studies on the effectiveness or efficiency of mhealth

Author and published year	Title	Target	Results/Implications
Li et al., 2019	The current state of mobile phone apps for monitoring heart rate, heart rate variability and atrial fibrillation: Narrative review	Patients	Mobile phone apps have a place in the diagnosis, monitoring, and screening of arrhythmias and heart rate.(Li et al., 2019)
Guo et al., 2020	Mobile Health Technology to Improve Care for Patients With Atrial Fibrillation	Patients	Rehospitalization and clinical adverse events are reduced with an integrated care approach to holistic AF care, which is supported by mHealth technology.(Guo et al., 2020)

Table 2.1 Studies on the effectiveness or efficiency of mhealth (cont.)

Author and published year	Title	Target	Results/Implications
Quin et al., 2008	WellDoc™ Mobile Diabetes Management Randomized Controlled Trial: Change in Clinical and Behavioral Outcomes and Patient and Physician Satisfaction	Patients	Adults with type 2 diabetes who used WellDoc's software improved their A1c by a statistically significant amount.(Quinn et al., 2008)
Riangkam et al., 2021	Effects of a mobile health diabetes self-management program on HbA1C, self-management and patient satisfaction in adults with uncontrolled type 2 diabetes: a randomized controlled trial	Patients	In Thailand, a mobile health diabetes self-management program combined with conventional care improves patient outcomes in people with uncontrolled T2DM.(Riangkam, Sriyuktasuth, Pongthavornkamol, Kusakunniran, & Sriwijitkamol, 2021)

Table 2.1 Studies on the effectiveness or efficiency of mhealth (cont.)

Author and published year	Title	Target	Results/Implications
Garner et al.,2020	Effectiveness of an mHealth application to improve hypertension health literacy in India	Patients	The use of the mHealth app resulted in a statistically significant improvement in test results among participants.(Garner et al., 2020)
Costa et al., 2010	The impact of short message service text messages sent as appointment reminders to patients' cell phones at outpatient clinics in São Paulo, Brazil	Patients	Sending appointment reminders to patients' cell phones through text message is an effective way to lower nonattendance rates.(da Costa, Salomão, Martha, Pisa, & Sigulem, 2010)

Table 2.1 Studies on the effectiveness or efficiency of mhealth (cont.)

Author and published year	Title	Target	Results/Implications
Franko et al., 2012	Smartphone App Use Among Medical Providers in ACGME Training Programs	Healthcare providers	Over half of the respondents said they use apps in their professional practice, with drug guides (79 percent), medical calculators (18 percent), coding and billing applications (4 percent), and pregnancy wheels (4 percent)(Franko & Tirrell, 2012)
Payne et al., 2012	Smartphone and medical related App use among medical students and junior doctors in the United Kingdom (UK): a regional survey	Healthcare providers	The majority of students and physicians had one to five medical applications on their phones. Both groups utilize the app on a daily basis. Doctors preferred clinical score/calculator apps, whereas students used disease diagnosis/management and drug reference applications.(Payne, Wharrad, & Watts, 2012)

Table 2.1 Studies on the effectiveness or efficiency of mhealth (cont.)

Author and published year	Title	Target	Results/Implications
Mahmud et al., 2010	A text message-based intervention to bridge the healthcare communication gap in the rural developing world	Healthcare providers/ Hospital	The hospital's operational costs and worker time were reduced while the treatment program's capacity was raised by assisting health workers using mobile phones.(Mahmud, Rodriguez, & Nesbit, 2010)

2.5 Adoption challenges of mHealth

Despite the aforementioned benefit of applying mHealth, Both healthcare practitioners and patients are still having issues adopting mHealth. Gagnon et al. published a systematic review in 2016 that looked into the elements that influence healthcare professionals' adoption of mobile health (m-health) applications and found that the following were the primary elements that influenced mHealth adoption: The perceived usefulness and ease of use, design and technical problems, cost, time, privacy and security issues, familiarity with the technology, risk-benefit analysis, and engagement with others were all major variables in mHealth acceptance for healthcare professionals(Gagnon, Ngangue, Payne-Gagnon, & Desmartis, 2016).

Researchers are interested in not just the adoption of healthcare professionals, but also the adoption factors in end-users (patients); in "Proposing a mobile apps acceptance model for users in the health area: A systematic literature review and meta-analysis" conducted by Binyamin et al. in 2021 revealed the seven most commonly used relationships in this topic which were Perceived ease of use, Perceived usefulness, Attitude toward behavior, Subjective norms, Facilitating conditions, Behavioral intention and Actual behavior. These constructs are related to each other in the proposed model as figure 2.4 (Binyamin & Zafar, 2021).

Figure 2.4 The mobile apps acceptance model for users in the health area (Binyamin & Zafar, 2021)

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

The study was conducted using a qualitative approach as it serves to gather insight and realistic perspective from richer information provided by the interviewees than a quantitative approach because it allows the author to provide open-ended questions for more in-depth information. There are many different types of interviews., the method of semi-structured interview was chosen because it is appropriate for the goal of the study which is to investigate people's attitude towards and factors that encourage or discourage them from using Rama App by utilizing the Technology Acceptance Model (TAM), the Unified theory of Acceptance and Use of Technology (UTAUT) and Binyamin et al.'s mobile acceptance model for users in the health area as a theoretical basis in generating guided questions. The demographic of interviewees and research questions have all been thoroughly detailed.

Due to a social distancing policy against the COVID-19 outbreak in Bangkok during the data collection period, most the interviews were conducted over the phone call. Each participant will be briefed on the interview's purpose and asked to record the interview for efficient retrieval by the researcher. In addition, the participants will be notified about the privacy and security of the information they supply, as the researcher will ensure participant confidentiality by not collecting any identifying information and the information will not be disclosed for commercial purpose.

After the interviews are completed, the transcripts will be combined to identify common themes that reflect the participants' attitudes, pain points, or suggestions regarding Rama App.

3.2 Population and Sampling

Participants were chosen at random from patients who have used the Rama App before to ensure that they have firsthand experience to contribute. According to research about sample size; when employing a semi-structured interview approach, researchers have advocated 30 as an approximation or working number of interviews at which theoretical saturation can be expected (Morse, 2015) thus the authors aimed to interview about 30 participants in this research.

3.3 Research tools

The guided interview questions, which are divided into 3 sections which include Demographic data, Factors that encourage or discourage using Rama App (asking about factors that have been shown to have positive effects on behavioral intention in previous literature), and Recommendations from participants to improve the Rama App were prepared and reviewed by the author and research advisor before using. After greetings and briefly about the objective of the research, the following questions were applied.

1. Demographic data; Age, Occupation and Education level

2. What did you like about the Rama App?

3. For approximately how long have you used (did you use) this app?

4. How did you 'discover' this app?

5. Please show me how you use the app? Could you please tell me what is the difficulty on the first time you use the app?

6. Which features should an app provide in order to be of use in your daily treatment

7. What do you think about Rama App; in terms of ease of use?

8. What do you think about Rama App; in terms of usefulness?

9. What are your thoughts on folks that use the Rama App?

10. What role do your doctors, nurses, friends, and family have in your decision to use the Rama App?

11. How does the Rama App work with your mobile device and internet connection?

12 Any issues or flaws you've discovered when using the Rama App?

13. To what extent do you anticipate benefiting from Rama App in the future?

CHAPTER IV
RESULTS

The results will be presented according to the 3 sections previously described in Chapter 3 which are Demographic data, factors that encourage or discourage using Rama App and Recommendations from participants to improve the Rama App.

4.1 Demographic data

All participants (P1-P30) were asked for basic demographic information such as their age, education level, and occupation and summarized as shown from Table 4.1 to Table 4.4. The average age of the participants is 45 years old, with ages ranging from 18 to 73 years old. The majority of participants (43%) are retired government employees and office workers, with 6 and 7 participants, respectively. The study enrolled people with a wide range of educational levels, from a high school diploma to a doctorate degree, with the majority of participants (73 percent) having a bachelor's degree or higher.

Table 4.1 Participant's demographic

Participant	Gender	Age	Educational level	Occupation
P1	Female	40	Doctoral degree	University lecturer
P2	Female	49	Bachelor degree	Business owner
P3	Male	18	High School	University student

Table 4.1 Participant's demographic (cont.)

Participant	Gender	Age	Educational level	Occupation
P4	Female	68	Bachelor degree	Retired government officer
P5	Female	52	Bachelor degree	Office worker
P6	Female	21	High School	University student
P7	Female	37	Bachelor degree	Government officer
P8	Female	67	Vocational certificate	Retired government officer
P9	Female	26	Vocational certificate	Dental assistant
P10	Female	67	High School	Retired government officer
P11	Female	51	Bachelor degree	Government officer
P12	Female	61	Bachelor degree	Retired government officer
P13	Female	56	Master degree	Nurse
P14	Female	30	Bachelor degree	Office worker
P15	Female	33	High School	Unemployed
P16	Female	66	Doctoral degree	Retired government officer
P17	Female	33	Bachelor degree	Office worker

Table 4.1 Participant's demographic (cont.)

Participant	Gender	Age	Educational level	Occupation
P18	Female	38	Bachelor degree	Office worker
P19	Male	56	Bachelor degree	Soldier
P20	Male	44	Master degree	Office worker
P21	Male	27	Bachelor degree	Traditional Thai medical doctor
P22	Male	45	Doctoral degree	University lecturer
P23	Female	46	Bachelor degree	Office worker
P24	Female	28	Bachelor degree	Physiotherapist
P25	Male	45	Vocational certificate	Freelance
P26	Female	35	Bachelor degree	Freelance
P27	Male	73	High School	Business owner
P28	Female	71	Bachelor degree	Retired government officer
P29	Female	37	Bachelor degree	Business owner
P30	Male	27	Bachelor degree	Office worker

Table 4.2 Summarize of age of participants

Age range	Number of participants
Below 20	1
20-35	9
36-45	7
46-60	6
Above 60	7

Table 4.3 Summarize of occupation of participants

Occupation	Number of participants
Students	2
Business owner	3
Healthcare provider	4
University lecturer	2
Retired government employee	6
Government officer	3
Office worker	7
Freelance	1
Unemployed	2

Table 4.4 Summarize of education level of participants

Education level	Number of participants
High School and below	5
Vocational certificate	3
Bachelor degree	17
Master degree	2
Doctoral degree	3

4.2 Interview Results

4.2.1 The most often utilized function and reason for using it

The most popular Rama App function is the appointment schedule function; according to the interviews; When they need to find out the date of an appointment, all participants use it as a routine. Participants stated that it is far superior to the paper-based appointment card because they can recall the appointment date whenever they want without having to worry about losing the appointment card. Furthermore, the appointment automatically syncs with the calendar on their mobile phone, which helps them avoid forgetting the appointment date because they check their schedule on their phone on a regular basis. One participant praised the feature since it helps the environment by reducing the amount of paper used.

The second most popular function that participants appreciated was the check-in function as 20 from 30 participants are using it. This function is most benefit when they need to seek service from a crowded department such as medicine or surgery; Instead of having to arrive at the hospital early in the morning just to verify their appearance and register at the nurse station, they can check in online via the Rama app before they arrive or even before they leave home to go to the hospital which can substantially save time for them.

The majority of participants use the queuing system at the pharmacy counter because they can switch pharmacy waiting time to their free time for lunch or other activities; after finishing their visit to the doctor, the app will show the que number and keep updating which process of their medicine is at and then when the medicine is prompt; they can make a payment through cashier counter or online payment.

However, from the interviews, other functions in Rama app are not well known to participants in this study such as online payment system (5 participants); although the interview results show the participants who use the online payment system are satisfied with it because it can save time and is very convenient when paying online, only 5 participants use the payment function in Rama App. The other functions that minority of participants use are Telemedicine (4 participants); which they reveal that they use this function upon request from the hospital during COVID-19 pandemic situation and have some difficulty when using it as it require activation of Rama App

screen on their mobile phone all the time in order to get the incoming call notification from doctor; and online hospital register for new patient (1 participant) who quite satisfy with the fast process in generating new hospital number to register as a new patient at Ramathibodi hospital. For the rest features, the participants in this study do not use.

4.2.2 Difficulty in using Rama App

4.2.2.1 Registration process and first time using

According to the interview results, the author asked the question about difficulty on the first time the participant used the app and found that most answers are it is not difficult in using Rama App even when using for the first time; however; elderly participants may have some difficulty as they revealed that they need some help from nurses or family members to guide them through the process such as downloading the application from App Store or Play Store, user identification process and also guiding about how to use the app. The author also inquired about the best way to teach the elderly or others unfamiliar with technology how to use the Rama App. The answer to this topic varies, but some popular responses include hands-on instruction by nurses, tutorial videos, and providing brief reminders when users enter specific functions.

4.2.2.2 Difficulty in using Appointment function

Many participants have expressed difficulty using the Rama App, particularly when attempting to change their appointment date, because the system limits the user's ability to change their appointment within 7 days of the scheduled date, forcing them to revert to the old method of calling or walking into the department to request an appointment change, which is far more time consuming. Furthermore, it can take up to three days to find out whether or not the request for an appointment modification has been granted. Another issue with the appointment change function is that the system does not notify users whether their request has been accepted or denied, forcing them to open the Rama App to check the results.

4.2.2.3 Difficulty in using Telemedicine

In order to maintain social distance in response to the COVID-19 pandemic situation, Ramathibodi Hospital just started telemedicine service called "Telecare" in 2020. Telecare is a method of communication in which a doctor and a patient converse via video call, which is integrated into the Rama App. The participants

responded that they appreciate the hospital's attempts to keep services functioning during this tough period, but that it is challenging for them because the system requires users to be on the Rama App screen at all times or they would miss the incoming call notification. Furthermore, several users have expressed that they are unable to request telemedicine services on their own; the hospital makes all decisions regarding who can use telemedicine and when to utilize telemedicine.

4.2.2.4 Difficulty in login process

Some participants also express their dissatisfaction with the application's frequent auto logout, which forces them to re-login every time they open it. In addition, Some individuals use the Rama App for multiple people, such as a mother who uses it for herself and her kid, or a daughter who uses it for herself and her elder parents. The application is not designed for multiple users, therefore persons in this category will have trouble logging in as the autofill username and password function will only remember the most recent user. Additionally, it is difficult to deduce that users must access the login page by clicking the avatar icon in the left upper corner rather than the text "Please sign in".

4.2.3 Attitude toward Rama App design

The majority of participants were satisfied with the Rama App's visual design, saying it was modern, well-organized, and simple to grasp; nevertheless, some were concerned about the font style and size, believing it was too small for the elderly to see effectively. The "5" and "6," for example, are difficult to differentiate, which could cause the user to misread the appointment date. According to one participant, the font color is too faded and seems uninteresting, akin to the environment in a hospital.

4.2.4 How did the participants discover the Rama App?

Half of the participants (15 out of 30) said they know about the Rama App from the nurse recommendation when visiting a doctor, while 7 said they receive recommendation from relatives or friends and 6 said they know the application from the advertisement board in Ramathibodi hospital. The participants reported that the recommender(s) informed them of the advantages of using Rama App, such as time savings and appointment management within the app, and that this piqued their interest

in using Rama App in the future. Two individuals who saw the app advertised on the bulletin board decided to download it without knowing what it was for.

4.2.5 Facilitating condition related with using Rama App

The proper device and internet signal are required for using Rama App; the device, which is a smartphone, must be able to use Rama App and keep up to date with the latest version of the application, and the internet signal must be strong enough to transmit data between the user device and the server. According to the interview results, practically all of the participants use their own internet from their mobile phone (only one uses WIFI), and all of them claim that their device and internet signal are sufficient for utilizing Rama App without problem. However, one participant stated that she had seen a patient with a poor internet signal, which made it difficult to utilize the Rama App in the hospital.

4.3 Recommendations from participants to improve the Rama App

4.3.1 Recommendations of the existing functions

Many participants would like Rama App to improve the appointment modification system in many ways such as 2 participants (P1 and P21) suggested that the app allow users to call or chat a certain department directly from the appointment schedule page.in case that she have a question to ask; another participant (P7) want Rama App to modify the way it works in appointment postpone because she wants to see the doctor's schedule in order to specify which doctor she wants to see; She also believes that incorporating a dropdown list of doctor names onto the appointment page is a smart idea. The problems that the users are not allowed to change the appointment after 7 days before the scheduled time and the system takes a long time to respond, either granting or denying the request are common; as 5 participants (P7, P10, P11, P10, and P29) said it would be helpful if they could change their appointment any time before the scheduled time and get a response within 24 hours.

In response to the login issue, one participant (P1) suggests that the system should be able to service multiple users and remember all of their usernames and

passwords; another participant (P14) suggested that users should be able to sign in by clicking the text "please sign in.". In addition, three participants (P6, P7, and P10) would prefer the app to remember the user's login even after they close it.

Apart from the aforementioned proposal, four participants (P10, P11, P22 and P26) suggested increasing the font size and modifying the typeface of the text within the app to make it easier for elderly people to read the information.

4.3.2 Recommendations of the future function(s)

The author discovered a wide range of replies to the question "To what extent do you anticipate benefiting from Rama App in the future?" However, extension of the Rama App's ability to record and present blood pressure, body weight, blood test results, and radiology reports are some features that participants demand in common (P2, P5, P11, P12, P22 and P29). Other interesting responses include adding extra payment channels, such as mobile banking (in addition to SCB) and e-wallet payments (from participants P15 and P21). In addition, 2 participants (P5 and P30) expect that in the future, Rama App would be able to provide historical information to users, such as when they went to the hospital, what condition they were in, and what treatment or medicine they received. Finally, a participant (P12) who uses the Rama App for her elderly father expresses that being able to see a list of all medications her father is currently taking would be extremely helpful because her father is sick with multiple conditions and must take numerous medications; this feature should reduce the risk of redundant medication use.

Table 4.5 Questions and examples of responses from participants

Question	Response	Answer in common
1.What did you like about the Rama App?	"I like Rama App because it is more convenient when using the app" "I like many things about the app as it substantially save my time, remind me about the appointment and I can modify the appointment via Rama App" "The function that I like the most is pharmacy queuing; I can have lunch while I wait for the medicine" "The cool feature is that he appointment was sync with my Google calendar therefore I got notification of appointment date"	All participants are currently using the Rama App. They think it is useful in terms of time saving in hospital service process and remind me of the appointment
2.For approximately how long have you used (did you use) this app	"I used Rama App since the beginning when it was the older version of App"	Most participants have experience in using Rama App more than 1 year

Table 4.5 Questions and examples of responses from participants (cont.)

Question	Response	Answer in common
3.How did you 'discover' this app?	"The nurse at the dermatology department always asked me "Have you downloaded the Rama App yet?"" "My aunt told me that Rama App is great; you can save plenty of time by using it"	Participants knew the Rama App from recommendation of the hospital staff especially nurses.
4.Could you please tell me what is the difficulty on the first time you use the app?	"At first, I'm not sure how to use the app, but luckily, the neighboring nurse was very helpful; she walked me through the complicated registration procedure and showed me how to check in and view my next appointment." "It is not difficult to use like other mobile application; I can use it instantly without seeking any instructions or help from others"	-It is not difficult to use the Rama App. -In terms of training to use the Rama App, approximately half of them self-learn, while the other half receive assistance from hospital staff in installing the application and providing instruction.

Table 4.5 Questions and examples of responses from participants (cont.)

Question	Response	Answer in common
5.Which features should Rama app provide in order to be of use in your daily treatment?	"I regularly check the app for my schedule appointment" "I use the app for checking my appointment, check in, check for pharmacy queuing and	-Appointment management and reminder -Check in (confirmation of attendance at services on the scheduled day)
6.What do you think about Rama App; in terms of ease of use?	"I found some difficulty when I use the app for modifying my appointment schedule as it takes at least 2 or 3 days to get approval from the system; I cannot manage my time schedule until the approval results came out" "Look at this, the number "5" and "6" are very similar; sometimes I get confused about the appointment date because the font is unclear for me."	-Most participants have no problem in learning to use Rama App -Many participants complain about the long time it takes to approve changing appointments. -Elderly participants complain about too small fonts and unclear fonts. -Difficulty in sign in process

Table 4.5 Questions and examples of responses from participants (cont.)

Question	Response	Answer in common
7.What do you think about Rama App; in terms of usefulness?	"It is very useful, it is more convenient as every appointment record is already there; I have no problem when I lose my paper appointment card anymore" "I awoke around 4:00 a.m., but there was no need to rush to the hospital; simply open the app and click the check in button, then arrive at the hospital about 1 hour before the scheduled appointment time is enough."	-Most participant appreciate the usefulness of Rama App as it can hugely reducing the time they need to spent in hospital and remind them about the appointment
8.What are your thoughts on folks that use the Rama App?	"I think it is pretty normal when someone using mobile phone" "I believe people who use the Rama App indicate that they are intelligent in their usage of technology to assist their lives."	-Most participants did not see using Rama App as a positive or negative behavior; they think it is very common to use a mobile application -A participants see people who use the Rama App as people who are comfortable with technology.

Table 4.5 Questions and examples of responses from participants (cont.)

Question	Response	Answer in common
9.What role do your doctors, nurses, friends, and family have in your decision to use the Rama App	"Apart from the nurse? No, the doctor never talking about this issue" "My coworkers utilize Rama App as well; I was the first in the group to do so."	-Most people learn about Rama App through a nurse's recommendation or a promotion campaign.
10.How does the Rama App work with your mobile device and internet connection	"Despite the fact that my phone is fairly ancient (it's a 2G phone), I can still use the Rama App." "I saw some patients have difficulty in using Rama App because of the poor internet signal"	-The majority of participants believe that using the Rama App requires only their own smartphone and an internet connection which is enough in using it without problem.

Table 4.5 Questions and examples of responses from participants (cont.)

Question	Response	Answer in common
11.Any issues or flaws you've discovered when using the Rama App?	"It annoys me to see the appointment notification badge for an appointment that I had already canceled." "I chose to call to request a reschedule appointment because operating via the program is not real-time; I'm scared I'll forget about it." "The application can't remember more than one user's username and password, which is problematic for me because I use my phone for both me and my father."	-Notification error. -Excessive logging is required. -Too long to wait for approval to reschedule appointments. - Difficult using Telemedicine function which integrated inside Rama App - The app is unable to record more than one user's user name and password.

Table 4.5 Questions and examples of responses from participants (cont.)

Question	Response	Answer in common
12.To what extent do you anticipate benefiting from Rama App in the future?	"What I hope for is that in the future, the Rama App will be able to display my blood test results and allow me to print them in case I need to go to another hospital." "I would like to keep track of when I go to the hospital, what problem I'm having, and what medications I have taken in the past."	-Personal health records -Laboratory results -More payment channels

CHAPTER V
CONCLUSION AND RECOMMENDATIONS

In order to research users' attitudes toward and variables that encourage or discourage them from using Rama App, the author used the technological acceptance model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT) model and Binyamin et al mobile's acceptance model for users in the health sector as a theoretical basis in developing guided questions for a semi-structured interview of 30 participants who are currently using Rama App. The common themes were discovered and will be presented in accordance with the constructs used in the reference mode as follows.

5.1 Perceived Usefulness (PU)

Perceived usefulness was described as the "degree to which an individual believes that using a particular system would enhance his or her job performance" (Davis, 1989). In the TAM model, Davis found that PU has a positive effect on the attitudes toward using (AT) which drive behavioral intention to use (BI) then BI will eventually positively affect actual system use. In addition to original TAM model, PU is constantly present as the major construct in the newer version of technology acceptance model(Binyamin & Zafar, 2021) such as the UTAUT model and, for mHealth, the study "Proposing a mobile apps acceptance model for users in the health area: A systematic literature review and meta-analysis" conducted by Binyamin et al. in 2021 which found that PU has a strong relationship to BI ,as a result, users who believe that a technology is useful are more inclined to use it..

According to the response of question 1 and question 7 in Table 4.5 ("What did you like about the Rama App?" and "What do you think about Rama App; in terms of usefulness?"), all of the participants state that their impression about Rama App is its usefulness such as reducing waiting times, assisting patients in better organizing their

own schedules, and assisting them in staying on track during their treatment course. When comparing the findings of this research to the above-mentioned reference model(Binyamin & Zafar, 2021), the results are similar as the Rama App is appreciated by the participants, notably in terms of time savings, reduced effort in using medical services, and ease of reviewing appointment dates and because of this usefulness of the application that make they keep using the application.

5.2 Perceived ease of use (PEOU)

Perceived Ease of Use (PEOU) refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). Apart from the original TAM model, PEOU has also played a major role in subsequent technological acceptance models such as the UTAUT model (Binyamin & Zafar, 2021) and Binyamin et al.'s "mobile apps acceptance model for users in the health area.". According to these models, users who regard a technology as simple to use are more likely to use it than those who do not. In addition, from the original TAM model, PEOU not only has an effect on AT, but it also has a positive effect on PU. To put it another way, when people perceive a system to be simple to use, they are more likely to consider it as useful.

In the context of Rama App, PEOU can be assessed at several stages of the application's use, including during installation, sign-up, learning to use the app, and real use of the app's services. The interview findings are consistent with the aforementioned model in that the majority of the participants feel Rama App is simple to use, which leads them to appreciate the app and use it on a frequent basis when they visit the hospital. However, the author noticed that not all users are satisfied with the system; some participants reported having difficulty using some of the Rama App's features, such as login page, appointment change, Telecare (telemedicine) or payment system. It's interesting because the author discovered that the majority of them do not immediately quit using that feature when they encounter difficulties. The TAM model can explain these phenomena since it revealed that PU has a far larger link with usage than PEOU, meaning that If the users wish to gain from utilizing a particular system,

they are willing to put in greater effort to overcome the system's complexity (Davis, 1989).

5.3 Subjective norms

Subjective norms are defined as "a person's perception that most people who are important to him think he should or should not perform the behavior in question"(Fishbein & Ajzen, 1975). Subjective norms and social influence are used interchangeably in technology acceptance research. In UTAUT model which use the terms "social influence" give its definition as "the perceived external pressure that individuals feel in the process of being informed about innovation and decide to use it and to the degree in which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al., 2003). In addition, the study "Proposing a mobile apps acceptance model for users in the health area: A systematic literature review and meta-analysis" found that In the domain of mobile health types, subjective norms is the third most widely utilized construct (Binyamin & Zafar, 2021).

According to the interview results, the author found that 22 out of 30 (73 percent) reported that they first learned about the Rama App via nurses, family members, or coworkers before deciding to use it. This suggests that subjective norms positively address the behavioral intention to use, which is in line with the UTAUT model and Binyamin et al.'s study.

5.4 Facilitating conditions

Facilitating conditions in the context of mHealth is the degree to which users have the required resources to use mHealth types (Binyamin & Zafar, 2021). Both UTAUT model and Binyamin et al.'s study demonstrated the positive effect of facilitating conditions on BI. From the interview results, the author found that all participants use their own smartphones and internet signal which has no problem in using Rama App. This could imply that facilitating conditions positively address the intention to use the Rama App, which is in accordance with the UTAUT model and the Binyamin et al. study. However, in today's world, having a smartphone and a strong

enough internet connection to use a mobile application is extremely typical therefore in the author's opinion; the facilitating conditions has moderately impact on addressing user's intention to use Rama App.

5.5 Attitude toward behavior (AT)

Attitude toward behavior refers to a user's positive or negative belief about using a certain technology (Fishbein & Ajzen, 1975). The construct was proposed to have a positive impact on BI in the TAM model, UTAUT model and Binyamin et al.'s study. In addition, the TAM model proposed that PE and PEOU have positive effects on AT before the AT has positive effects on BI eventually. From the interview results the authors intend to use the question "What are your thoughts on folks that use the Rama App?" to evaluate AT of Rama App user's; the responses are not negative but also not strongly positive as the majority of interviewees responded that they consider "using Rama App" to be a social norm in a culture where everyone owns a smartphone and uses mobile applications to make their lives easier. As a result, when compared to PE, PEOU, and subjective norms, the AT has a minor impact on addressing behavioral intention to use Rama App.

On Figure 5.1, the author proposes The Mental Model on the Acceptance of Rama App based on the qualitative study. This model was adapted from the mobile app acceptance model for users in the health area (Binyamin & Zafar, 2021). The dashed line in this conceptual model represents moderate effects, whereas the bold line represents strong effects on the particular constructs. To elaborate, perceived ease of use (PEOU), perceived usefulness (PU), attitude toward behavior (AT), subjective norms (SN), and facilitating condition are the five variables that determine behavioral intention to use (BI), however, as previously stated, these factors do not equally address behavioral intention to use (BI). Only PU, PEOU, and SN strongly address the BI, whilst AT and SN only moderately address the BI. Future study on the Rama App and other hospital apps primarily focus on assisting patients through the hospital process, should benefit from the proposed conceptual model.
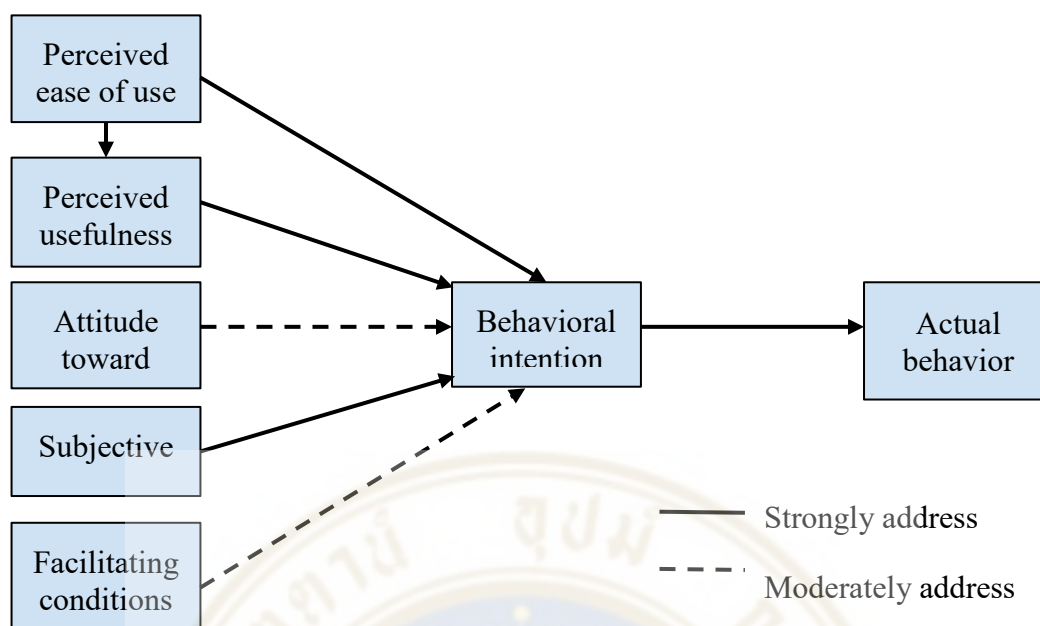
Figure 5.1 Mental Model on the Acceptance of Rama App (based on the qualitative study)

5.6 Recommendations

The author made the following recommendations for app developers and hospital executives based on the interview results and discussion in 5.1-5.5.

5.6.1 Improve application performance

The rationale behind this advice is that the user's adoption rate are based on how it benefits the user and how simple it is to use. According to the interview results the area of improvement should focus on the following features

5.6.1.1 Appointment management

Appointment viewing and modifying features received many praises as well as criticism from participants in this study; this is because it is the most common function used by the participants. The application developer should make Rama App to be able to provide additional value information and functions such as integrating a dropdown list physicians schedules into the appointment changing page so the user will have more information to aid his/her appointment changing decision, allowing users to call a certain department with a single click from the app or a quick

chat with real-time responsiveness to answer questions from the users and the most pressing need is to improve the appointment-changing system so that it can respond more rapidly. It should reply in real time, but if that is not possible, it should not take more than 24 hours to approve or deny the request.

5.6.1.2 Change font type and increase font size

The rationale is because the author received feedback from the participants concerning the app's confusing fonts, which may cause users to misinterpret the content. Furthermore, because Thailand is already facing an aging society, addressing this issue now will assist the majority of patients in the future. Choosing a more clearly distinguishable font, increasing the text size, or allowing the app to zoom in is a fantastic option.

5.6.1.3 Multiuser should be allowed.

The author discovered during the interview that some users have problems using the application because it does not allow multiple users to save their username and password.

5.6.1.4 Fixing Telecare features

Both users and providers feel difficult in making video calls because patients will not be able to see the incoming call notification if the screen is turned off. The developer should focus on fixing this issue to allow incoming video calls visible without having to have the screen turned on all the time.

5.6.1.5 More payment options

Users inquire about a variety of payment options such as e-wallet and more options of mobile banking payment.

5.6.1.6 Future development

Many participants in this study requested that the Rama App be used as a personal health record in the future. The app should be able to show the user's blood test results, radiological reports, history of hospital services used, body weight and blood pressure readings.

5.6.2 Use staff recommendations as the main method of promotions

The author discovered that the most effective way to promote Rama App is through recommendations from healthcare personnel, rather than advertisements on

posters or social media. As a result, Ramathibodi Hospital should continue to promote Rama App through nurses and physicians' recommendations. Furthermore, executives could deploy policy to frontline personnel to propose such features to patients in order to increase usage of specific functions that appear to be underutilized based on the interview, such as the online payment feature.

5.7 Limitations

The limitation of this research is the author's technique of selecting participants, which is convenience sampling. As a result, the results of this study may under or over represent Rama App users, as well as biases in participant selection may unintentionally occur. Researchers can use the limitations indicated above as a guide to conduct research in the future by utilizing a criteria-based sampling to explore the views of a certain group such as the elderly or young generation. And at last, in order to provide more coverage to Rama App's users, the researcher can conduct a quantitative study in the area of user acceptance to Rama App, combining the findings from this study with the proposed mental model to create a questionnaire evaluating the relationships between the constructs, which may result in more insights due to the increased coverage of Rama App's users.

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