WILLINGNESS TO PAY FOR mHEALTH APPLICATION: THE RELATIONSHIP BETWEEN ATTITUDE, SOCIAL INFLUENCE AND SELF-EFFICACY WITH THE MODERATING EFFECT OF INITIAL TRUST

SHARIDATUL AKMA ABU SEMAN

UNIVERSITI SAINS MALAYSIA

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by

SHARIDATUL AKMA ABU SEMAN

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LIST OF ABBREVIATIONS

App	Application
AVE	Average Variance Extracted
GAMMA	Gallery of Malaysian Government Mobile Application
HBM	Health Belief Model
IT/IS	Information Technology / Information System
MAMPU	Malaysian Administrative Modernisation and Management Planning Unit
mHealth	Mobile Health
mHealth Application	Mobile Health Application
MCMC	Malaysian Communication and Multimedia Communication
PBC	Perceived Behavior Control
PEOU	Perceived Ease of Use
PLS-SEM	Partial Least Square-Structural Equation Modeling
PU	Perceived Usefulness
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
VAM	Value-based Adoption Model
WTP	Willingness to Pay

LIST OF APPENDICES

KESEDIAAN MEMBAYAR UNTUK APLIKASI mHEALTH: HUBUNGAN ANTARA SIKAP, PENGARUH SOSIAL DAN KEYAKINAN DIRI DENGAN KESAN PENYEDERHANAAN KEPERCAYAAN AWAL

ABSTRAK

Walaupun potensi pertumbuhan yang besar bagi pasaran aplikasi mudah alih diramalkan, kesediaan membayar pengguna untuk aplikasi mHealth memerlukan penelitian lebih lanjut. While a huge growth potential for the mobile application (app) market is predicted, users' Willingness to Pay (WTP) for mHealth applications need further research. Lima belas hipotesis diuji dalam model yang baru dibangunkan berdasarkan tiga teori utama Model Penerimaan Teknologi, Teori Tingkah Laku Terancang dan Model Kepercayaan Kesihatan. Tiga peringkat prosedur pengumpulan data awal dijalankan. Peringkat 1 melibatkan kajian awal untuk mengenal pasti kategori mHealth yang paling kerap digunakan oleh rakyat Malaysia dan platform telefon pintar paling dominan dalam kalangan kebanyakan pengguna. Penemuan dalam Peringkat 1 mengesahkan bahawa Sukan dan Kecergasan merupakan aplikasi yang paling digemari, sama dengan negara lain, Android mendominasi pilihan pengguna. Seterusnya pada Peringkat 2, carian dijalankan menggunakan Google PlayStore untuk menentukan aplikasi teratas Sukan dan Kecergasan yang terdapat dalam pasaran. Enam puluh satu dari 1500 aplikasi yang diperoleh dalam Peringkat 1, dipilih untuk Peringkat 2 untuk diteliti dalam lebih lanjut dalam Peringkat 3 yang melibatkan proses mengukur kualiti keseluruhan aplikasi yang diperoleh pada peringkat sebelumnya. Bagi mengelakkan sebarang kecenderungan terhadap kandungan kualiti aplikasi, hanya satu aplikasi digunakan semasa menjawab soal selidik. Berdasarkan proses penapisan dalam Peringkat 2,

semua aplikasi diteliti menggunakan Skala Penilaian Aplikasi Mudah Alih (MARS). Hasil penelitian menunjukkan Sworkit dan Fitbit Coach sebagai aplikasi teratas yang mempunyai penarafan tertinggi dari segi penglibatan, estetika, fungsi, dan maklumat. Oleh itu, kedua-duanya ditawarkan sebagai pilihan dalam tinjauan akhir. Seterusnya, model yang dicadangkan dinilai secara empirikal menggunakan pendekatan tinjauan bersemuka dengan 327 orang responden di empat buah negeri iaitu Selangor, Kuala Lumpur, Putrajaya dan Pulau Pinang. Perisian IBM SPSS 23 dan SmartPLS 3 digunakan untuk menjalankan analisis. Antara hipotesis yang diuji, sepuluh daripadanya diterima. Kajian menunjukkan sikap, ulasan dalam talian, inovasi mudah alih peribadi merupakan faktor peramal penting bagi pengguna Malaysia terhadap WTP. Sementara itu, penarafan Aplikasi, Efikasi Kendiri Kesihatan, Efikasi Kendiri Mudah Alih, Tarikan Mudah Alih dan Pengalaman Penyakit tidak memberi kesan terhadap WTP. Kajian ini juga mengesahkan tanggapan mudah guna dan tanggapan kebergunaan sebagai pengaruh penting terhadap sikap pengguna, dengan kebergunaan dipengaruhi oleh kesedaran kesihatan dan tanggapan harga. Selain itu, peranan penyederhanaan kepercayaan awal berjaya disokong. Tanggapan keselamatan dan tanggapan privasi memberi kesan terhadap kepercayaan awal ke arah sikap untuk membayar aplikasi. Dapatan kajian ini menambahkan pengetahuan yang berkaitan dengan tingkah laku pengguna telefon pintar khususnya tingkah laku pembelian aplikasi mHealth dan menyumbang kepada praktik dengan memberikan pemaju aplikasi sedikit pandangan tentang apa yang membuatkan pengguna membayar untuk teknologi.

WILLINGNESS TO PAY FOR mHEALTH APPLICATION: THE RELATIONSHIP BETWEEN ATTITUDE, SOCIAL INFLUENCE AND SELF-EFFICACY WITH THE MODERATING EFFECT OF INITIAL TRUST

ABSTRACT

While a huge growth potential for the mobile application (app) market is predicted, users' Willingness to Pay (WTP) for mHealth applications need further research. Fifteen hypotheses were tested in a newly developed model based on three main theories: Technology Acceptance Model, Theory of Planned Behavior and Health Belief Model. Three stages of preliminary data collections procedures were conducted. Stage 1 involved a preliminary study to identify the most frequent mHealth categories and the most dominant smartphone platform used by Malaysians. The findings in Stage 1 confirmed that Sports and Fitness were the most favorable apps, while Android platform was most preferred. In Stage 2, a Google PlayStore search was conducted to determine the top Sport and Fitness applications available on the market store. Sixty-one, out of the 1500 apps retrieved, were further examined in Stage 3. Stage 3 involved measuring the overall quality of applications retrieved in the previous stage. To avoid any bias towards the quality content of an app, only one application could be selected when answering the questionnaire. Based on the filtering process in Stage 2, all the apps were examined using the Mobile Application Rating Scales (MARS). The results indicated that Sworkit and Fitbit Coach were the top applications with the highest rating in terms of engagement, aesthetics, functionality, and information. Thus, they were selected for the final survey. Next, the proposed model was empirically evaluated using a face-to-face survey involving

327 respondents from four different states, namely Selangor, Kuala Lumpur, Putrajaya and Penang. IBM SPSS 23 and SmartPLS 3 software were used to conduct the analysis. Among the tested hypotheses, ten were accepted. Attitude, online review, personal mobile innovativeness were significant predictors of the Malaysian users' WTP. Meanwhile, App rating, Health Self-Efficacy, Mobile Self-Efficacy, Mobile Affinity and Illness Experience had no impact on WTP. The study also confirmed that the perceived ease of use and perceived usefulness as important dominators of the user's attitude, with usefulness, being influenced by health consciousness and perceived price. The moderating role of the initial trust was supported. Both perceived security and perceived privacy had an impact on the initial trust in the users' attitude to pay for the app. The findings of this research add to the body of knowledge related to smartphone behavior particularly in mHealth applications purchase behavior and contribute to practice by giving developers some insight into what makes users pay for the technology.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter highlights on smartphone technology research, its fundamental role in healthcare, and how the use of this technology will benefit individual users, specifically in helping the public to take care of their health. The proceeding section explains the current state of healthcare in Malaysia and discusses how smartphone technology can benefit the Malaysian public in general. The next section highlights the problems that are addressed in this study. Next, the study objectives are provided, as well as the study's significance. This section also sets out appropriate definitions of important concepts used in the research. This section concludes with a short description of the organizations in this dissertation of the following sections.

1.2 Background of the Study

The rapid development of mobile technologies has introduced multifunctional smartphones that have changed how people live. The extensive use of the mobile phone can be reflected through the tremendous number of smartphones sold worldwide. It was reported that in 2018, approximately 1.56 billion units of smartphones have been sold worldwide (Statista, 2019d), and the number is projected to increase.

People are increasingly reliant to use their smartphone devices to download and access mobile applications or apps. A mobile application is defined as a software programs that can be installed on smartphones or tablets to allow users to perform a specific task (Liu et al., 2014) and each app has a particular functionality such as for banking, managing work through email, planners, social media communication, and

for healthcare monitoring. Mobile apps can usually be split into hedonic apps (for example, music, media, entertainment, and games) or utilitarian apps (news, health-related, productivity, browsing). Apps are common with consumers, as they can be readily reached and accessed for free of charge or at a fairly small cost via platforms like the Apple iOS App Store, Google Play Store, and other platforms or portals.

Different studies have highlighted that it is challenging to determine a precise number of apps that are available in the market, as the number keeps increasing every day. According to Statista (2018a), more than two million apps have been added to the Apple App Store in the past half of 2018, and 2.1 million apps have been made available to Android customers through the Google Play Store. In addition to these two platforms, as shown in Figure 1.1, there are several other platforms for users to download and purchase apps including Amazon AppStore, BlackBerry App World, and Windows Phone Store were among the less-performing app stores after the two dominant platforms (Statista, 2018a).

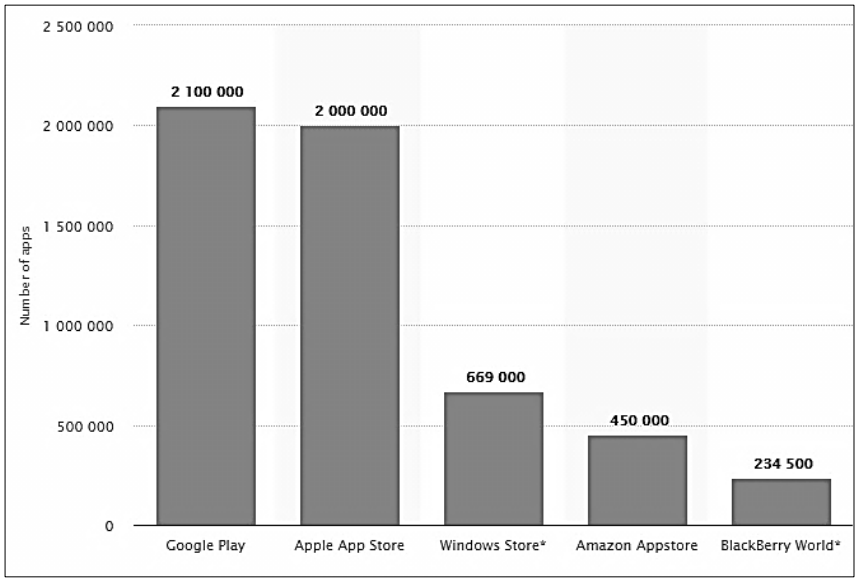

Figure 1.1 Number of Apps from Different Platforms

1.2.1 Mobile Health Application (mHealth Application)

The Healthcare Industry is among the first industries to adopt mobile apps for improving healthcare and as a medium to disseminate information about healthcare. The modernization of mobile technologies has garnered interests from different parties as it can provide personalized individual healthcare advice to fulfill the demand for real-time medical health guidelines. Traditionally, healthcare information was either provided through leaflets, media advertisements, and forums. However, the use of these mediums is often deemed as costly, time-consuming. Subsequently, information is channelled through electronic media such as websites and blogs, but such a medium could only target limited audiences. This calls for mobile health applications or so-called ' mHealth ' apps, which offer a customize and dynamic engagement in delivering individual health care information to improve health outcomes (Sama, Eapen, Weinfurt, Shah, & Schulman, 2014).

At this moment, there are thousands of mHealth applications for download across apps stores for different operating systems. These applications are designed either for consumers, healthcare professionals, or both. Medical applications and Health & Fitness applications are two distinct classifications of healthcare applications in the App Store. Health & Fitness applications have been revealed to account for 56 percent of the fitness applications on the list, primarily to assist the overall population handle their wellness, while medical applications, aiming at medical practitioners and managing more complicated healthcare requirements, account for 44 percent of the applications on the list (Research2Guidance The App Market Specialist, 2015).

The use of mobile apps revolutionized healthcare as it provides an alternative to a face-to-face consultation with medical professionals to obtain medical advice for patients with diseases or illnesses. As a result, mHealth apps emerged as a powerful

tool to monitor one's health status using smart device technologies. These apps provide different functionalities such as for monitoring of daily exercise, diet logs, tracking period cycle, general medical education and managing glucose level for diabetic patients, which enable individuals to practice self-care, monitor their health status, keep track of their activities and manage lifestyle decisions to improve their health and well-being. Boyce (2014) advocated that these apps can provide a fast and cost-efficient platform for healthcare providers to offer their services, and for consumers to optimize their health. Another study found that mobile health apps can save up to € 99 billion in healthcare costs (PWC, 2013). This is supported by Paglialonga, Lugo and Santoro (2018) which argued that mHealth apps are capable of helping individuals to manage their healthcare, promote healthy living and provide valuable information without any time or space constraints.

Recent evidence has shown that the usage of the mHealth app is increasing rapidly. Recent data shows that the number of apps developed, as well as the number of applications downloaded by consumers, has increased positively. A majority of these apps offered are offered as free apps with additional premium features for paid download. In addition, the top mHealth applications generated up to four million free downloads (Müller, 2013). Based on this trend, the industry is expected to inflate, and it is projected that the industry will collect a revenue of up to 60 billion dollars by 2020 (“mHealth - Statistics & Facts | Statista,” 2019).

1.2.2 Mobile Application Economy

In the app economy, an app in the market store can be categorized as free-to-play, freemium (or also known as in-app), or premium apps. In 2017, about 325,000 mHealth apps were reported to be available on the market (Reearch2guidance,

2017). Each of the app presents a monetary model with its specialty. A free-to-play app is a free app that can be downloaded and used by any users without any fees. Due to its complementary nature, most of these apps are designed as information apps, and there is little interaction between users and the app's interface. The next category of apps is freemium (or in-app) apps that provide basic functionality without charging any fees. However, users are required to pay a small fee to access more advanced features, advertisement-free version, additional contents, extra benefits or an upgraded or premium version of the app (Seufert, 2014; Liu, Au, & Choi, 2014).

The last type of apps is paid, or premium apps, where only paid users are allowed to access the apps. Paid apps have more advanced features and more complex functionalities. Among these three apps business model, it was reported that freemium apps are the most profitable. Hence, this concept has widely applied to promote applications in different categories (Yang, Huang, & Su, 2017). According to Yang et al., (2017), 83% of the top 1,000 apps on the Freemium business model, both in the Google Play and iOS App Store.

Yet, unlike traditional or web-based marketing environments, mobile applications often face a challenge in marketing paid or freemium apps as developers and marketers, finding it difficult to sustain their turnover. Even though a paid app only costs an average of 1.02 U.S. dollars (Statista, 2018b), most users are not willing to spend more than US $10 annually on app purchases (Research2guidance, 2016). It was reported that more than 60% of app developers only gained less than $500 from selling their apps. This forces most developers to monetize their apps indirectly through advertising and in-app purchasing (Dinsmore, Swani, & Dugan, 2017).

Statista, one of the largest Internet statistics companies, has studied the willingness for individuals to pay for the upgraded version of applications in Ireland

and found that only 20.4% of participants are prepared to pay extra for upgrade version downloads (Statista, 2014a). Similar online surveys conducted in Germany in 2010 and 2014 revealed a decline in the purchasing behavior of app users. In 2014, only 9.5 of those responding to an application were reported to be ready to spend up to EUR 1.99 (Statista, 2014b). The same study also reported that in 2014 the number of users who are not prepared to pay for the app had risen slightly to 69.9%, as opposed to 64.5% in 2010 (Statista, 2014b). Another study carried out in the United States showed that 57% of consumers never paid for an app (Perez, 2017), proving that paying for an app is a big concern in almost all countries in the world. In another study, smartphone users are more likely to pay for mobile gaming applications with revenue of 105.2 billion US dollars expected to reach in 2021 (Statista, 2018c). Still, as far as the author concern, nothing much is known on paid app activities among Malaysian users. Among data found are by Statista (2019a), reported that the number of users is expected to reach 3.5 m by 2023. Still, as seen in Figure 1.2, the penetration rates are higher for non-paying app users, with 7.2 compares to only 3.1% of paying users (Statista, 2019a).

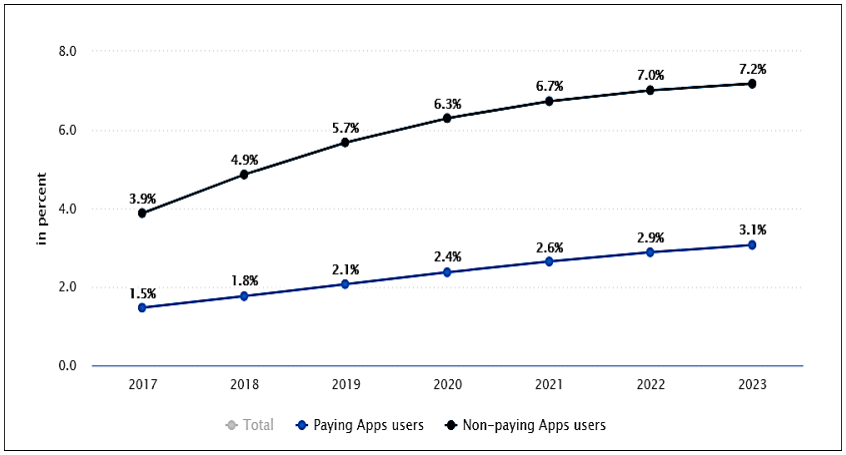

Figure 1.2 Mobile Apps Penetration Rate in Malaysia

Very little research has been undertaken with the mHealth application, and minimum data have been discovered on the willingness of consumers to pay for accessing freemium health apps. In this light, based on the current interest in healthy living, mHealth apps have become more popular, and it was reported that 74.8% of these apps are freely available (Xu & Liu, 2015). Consequently, according to a survey conducted by Research2guidance, mHealth app developers still do not gain any profits from developing mHealth applications. 57% of these developers are struggling to make their apps noticeable, while majorities 64% of the successful apps are developed by large companies (Research2Guidance The App Market Specialist, 2015).

In addition, there has been a lack of information about factors leading users to pay for mHealth apps. Among data found are from the study by Martin (2014), which measured WTP for mHealth services, rather than for the application itself. In the meantime, Müller (2013) research focussed on the implementation and WTP of established mHealth applications. Thus, although the app offers many benefits, it has been shown that factors that determine the consumer's decision to pay the mHealth app remain unknown.

1.2.3 Malaysian Mobile Technologies and Healthcare Sector

Malaysia is one of the highest smartphone adoption countries with a penetration rate of 54% in 2018, and the amount is expected to increase to over 20 million by 2020 (Statista, 2019b). In 2017, approximately 17.1 million Malaysians used a mobile phone to access information, and this number will increase to 21.8 million in 2023 (Statista, 2019c). As mentioned in the *"Handphone Users Survey 2017"* published by the Malaysian Communication and Multimedia Communication

agency (MCMC), the number of smartphone users in the country have increased dramatically and one person will own at least one smartphone with the highest rate of adoption was recorded among adults aged between 20-34 years old (MCMC, 2017).

Malaysia is on its path to become a modern, developed nation. At present, many Malaysians are more health-conscious and more open to learn about a healthy lifestyle. As a result, the Malaysian healthcare industry is thriving, and it has seen significant improvement since the country's independence in 1957. Healthcare in Malaysia is delivered through public and private health care providers and supported by nongovernmental organizations (NGOs). Similar to other middle-income countries, the government of Malaysia faces challenges in maintaining and offering equitable and effective health care services (Mohd-Tahir, Paraidathathu, & Li, 2015) due to various reasons such as the escalating costs of healthcare, higher insurance premium, barrier of universal health coverage, and increasing chronic disease prevalence.

Like other developed nations, Malaysia has a high potential to provide accessible, personalized mobile-based healthcare services. The use of mobile apps can overcome the barriers to equitable and efficient delivery of healthcare services. Consequently, mobile apps have gained popularity, and the mHealth industry is rapidly growing. There are some efforts to establish the use of mHealth technologies and promote the use of mHealth apps in society. One of the examples is the 1Gov Appstore, which was introduced by the Malaysia Government. The Appstore is run by the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) and enables Malaysian consumers to access apps developed by Malaysian government organizations via the Gallery of Malaysian Government Mobile Application (GAMMA) for free across all major mobile platform (MAMPU, 2015).

The applications in the Appstore include healthcare applications designed by the Malaysian Ministry of Health, as follows:

Table 1.1 mHealth Apps Available Through 1 Gov AppStore

App Name	Description	Administrators
MyHealth	Providing information on medical practitioners, health tips, health facilities, health risk and assessment,	MAMPU
myMahtas	Providing information on clinical practices, including medical & cosmetics procedures, regenerative medicines, pharmaceutical products, and other products and services in accordance with Malaysian Health Technology Assessment.	MAMPU
MyNutriApps II: MyNutriDiari	This app is mainly aimed at generation Ys. Assist users in handling food consumption, self-manage healthcare, and create the right mindset and lifestyle.	Nutrition Division, Ministry of Health, Malaysia,
My Blue Book	Provide a convenient and quick reference tool for Medical students and Medical Professions to guide them on how to offer better health care.	Malaysia & Pharmaceutical Services Division MOH, 2016
MyFoodSafe	Provide endorsed information regarding certified companies & products as well as manufacturers of bottled water and mineral water	MAMPU

Source: MAMPU (2015)

On the other hand, even with the steady increase in smartphone adoption among its population, Malaysian app developers are still struggling in the App Economy. A recent report revealed that only 26% of Malaysians made an in-app purchase with less than ten downloads per individual (Ng, 2015). This report shows that current practices from the end-user downloads and purchase activities are

insufficient to bring profits to local mobile app developers. This issue reflects the need to understand this situation further.

With regard to the trend for mobile apps, the study showed that most users use mobile apps to shop and 78% of Malaysian app users also use mobile apps to access social media followed by to receive and reply emails (73%), watch video (63%), checking the balance of bank accounts or the latest transfer (53 %) and play free games (52 %). Nevertheless, Malaysians tend to take part in activities that can improve their health, but the shift is still being led by the Business-to-consumer platform. As the use of mobile apps is still a new practice, there are limited research materials on the post-adoption usage behavior of m-Health apps and what influence Malaysian users to pay for the application.

Most recent studies have reported Malaysians have increasingly used and downloads mobile application for e-commerce, education, games, transportation (Mohd Suki & Mohd Suki, 2017; Weng, Zailani, Iranmanesh, & Hyun, 2017) as well as for tourism (Anuar, Musa, & Khalid, 2014). However, despite the government's effort and the prospect of mobile technologies, the use of mobile apps, including mHealth apps among Malaysians is still low (Kamaruzaman, Hussein, & Fikry, 2016) and there is minimal study conducted to understand the usage of mobile health applications among Malaysians. Yun, Abdullah, Idrus, and Keikhosrokiani (2017) reported that while 48.7% of the respondents use mHealth apps, there is no evidence of what categories of mHealth apps are downloaded by users. Another study by Teo, Ng and White (2017) identified that an excellent app must be personalized, trustable, easy to use, and provides social connectivity among the users. In the meantime, other research concentrated on developing a prototype (Bal et al., 2015) and provided a

general review of available apps (e.g., Azhar & Dhillon, 2016; Benferdia & Zakaria, 2014; Zahra, Hussain, & Mohd, 2016).

1.3 Problem Statements

Due to the influx of free apps in the market, more empirical evidence is needed to provide a comprehensive understanding of how app marketers could increase their profit margin while competing with a large number of ‘free’ apps. Previous research on freemium business models has focused on browser-based online businesses, which are distinct from the mobile app context. Given the great number and wide variety of mobile apps, many app developers are aggressive in pursuing a paid customer.

Despite rapid growth, with more than 60% of app developers are generating less than $500 a month from their apps, with the remaining developers are forced to indirectly monetize their products via in-app or advertisement (Dinsmore et al., 2017). Thus, a greater understanding of what’s a factor influencing users to pay for the app is needed to enhance the profitability of large and small developers alike. The success of mobile app subscriptions relies to a great extent on users' willingness to pay. Even though factors leading to willingness to pay are many but critical to this effort will be the identification of individuals' behavioral attitudes. Although the behavior of app users has been widely studied, most of the studies limit their framework to the objective of user intention, to adapt to the technologies excluding their real behavior as the final construct.

Consequently, the factors that contribute to user purchase decisions for the apps are an important consideration for app publishers and also the app marketers. However, despite a significant number of studies on WTP, there are several gaps identified.

First, there are limited studies on Willingness to Pay (WTP) or purchase decision in the context of mobile application (Hebly, 2012; Hsiao & Chen, 2016; Racherla, Babb, & Keith, 2011; Wang, Chang, Chou, & Chen, 2013; Wu, Kang, & Yang, 2015; Kim et al., 2016;). This indicates the need for more studies in this area (Xu, Peak, & Prybutok, 2015). With most basic apps are freely available (Hebly, 2012), most consumers decline to pay (Chyi, 2012) and are willing to uninstall the apps once they know that additional payment is required (Krebs & Duncan, 2015).

Secondly, most studies done on this topic did not focus on the WTP for a specific category of apps. WTP for apps is dependent on their categories (Dinsmore et al., 2017). In the mHealth application context, nothing much is known about purchase behavior. Focusing on this notable phenomenon in relation to mHealth, many new researches have developed exploring the key factors that motivate users to adopt new health-oriented technologies. However, despite the huge number of health apps that have sprung up everywhere, only a small number of apps (e.g., Noom Diet, Nike+, and Lose It) are successful across the whole mHealth market. Moreover, inadequate amount of studies focused on mHealth apps (Lu, Mao, Wang, & Hu, 2015; Wu, Kang, & Yang, 2015; Al Dahdah, Desgrées Du LoÛ, & Méadel, 2015), and most exiting studies examined the use of prototype apps rather than evaluating existing apps (Fiordelli, Diviani, & Schulz, 2013). As mHealth is still a new phenomenon, little is known about the post-adoption behaviors (Cho, 2016). In comparison to other forms of mobile apps such as gaming apps, social media apps, and business apps, the interface of mHealth apps serve a significant function with more complex interface and functions (Harris, Brookshire, & Chin, 2016), Still, based on Goyanes (2014), consumers are less likely to pay for an application which provides knowledge compared to apps that provide entertainment and solution.

Next, regardless of the advantages offered by mHealth apps, factors that drive consumers to pay for the application remain unanswered. Understanding consumers' WTP is vital in bridging the gap between economic theory and marketing practices (Jedidi & Jagpal, 2009). Theoretically, Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) are widely used in most digital content studies to explain buying behavior, yet, the factors itself may not comprehensively reflect the users' willingness to pay for a healthcare app. Bull and Ezeanochie (2015) highlighted that despite various advantages offered by mHealth, the use of traditional social and behavioral science theories might fail to address critical theoretical issues that may be critical in a technology-delivered program. Supported by Zhao, Ni, and Zhou, (2018) proposed that the use of mHealth applications should be explored by extending the factors that drive health-related behaviors rather than relying on factors in the traditional behavior theory.

Previous surveys showed that WTP is not merely affected by subjective and objective item characteristics (Monroe, 1971; Srinivasan, Lovejoy, & Beach, 1997). Lee and Han (2015) further argued that it is not adequate to focus solely on technological developments to guarantee the achievement of mobile health applications. Although many studies in smartphone adoption demonstrated the perceived advantages of easy operation and usefulness impact user attitudes considerably (e.g., Chang, Lee, & Su, 2011; Schreiner & Hess, 2015), limited studies focused on the post-adoption behaviors (Kim, Baek, Kim, & Yoo, 2016). Studies have argued that subjective reasoning that influences WTP might be derived from various perspectives, either from consumer attitude (Hamari, 2015; Tambunan, Purwanegara, & Indriani, 2013), individual characteristics (Ivanic, Overbeck, & Nunes, 2011),

social factors (Auger & Devinney, 2007) or trust towards products and services (Roosen et al., 2015; Yoo, Parameswaran, & Kishore, 2015).

On the other hand, perceived barriers (perceived price) and perceived benefits (health concerns) are among the important determinants of perceived usefulness of the mHealth app. A study conducted by Hebly (2012) stated that high price is the hindrance for customers unwilling to pay for the app rather than other factors like customer ratings, reviews, and rankings. However, there are still limited evidence to support this claim. Akter and Ray (2010), lowering the price of an app is not the solution, as it has little role in ensuring continuous mobile app adoption (Kim, Shin, & Kim, 2011; Wu et al., 2015).

In contrast, health-conscious consumers are more open to try new technologies (Rai, Chen, Pye, & Baird, 2013). In this light, these consumers are staunch believers of "prevention is better than cure" and will do anything to find new information regarding healthcare. However, there is no evidence on whether this openness will increase their willingness to pay for new health information. Moreover, Hsu and Lin (2015) suggested that social influence is an important aspect in measuring paying decision. App rating and user review could entice initial users to pay. However, there is little evidence on this linkage (Doh & Hwang, 2009; Oh & Min, 2015; Yoo, Sanders, & Moon, 2013).

Numerous studies have shown empirically that self-efficacy is an important criterion in adopting innovative technology (Faqih, 2016; Kim & Park, 2012), and few have relate both mobile self-efficacy and healthcare self-efficacy towards WTP in the context of mHealth app (Duane, O'Reilly, & Andreev, 2014b; Wang et al., 2013). It is also argued that the role of final decision towards the buying process between the personal mobile innovativeness is not well understood (Cowart, Fox, & Wilson, 2008;

Rigi, Bakhsh, & Abtin, 2016). In addition, no studies have studied whether illness experiences and mobile affinity are directly affecting the user's readiness to pay for the mHealth application, to the best of the researchers ' knowledge.

Initial trust is considered a key factor in the use of new technology, especially in the context of threats (such as security and privacy issues) are present (Ayten Öksüz, Nicolai Walter, Bettina Distel, Michael Räckers, 2016). Research by Egelman, Felt and Wagner (2013) found that customers are prepared to pay for premium-priced applications in return for exchanging less private data. This is largely fuelled by the security and privacy concerns brought upon the increase of mobile apps available for downloads. mHealth applications require users to share sensitive data, such as locations, pictures, SMS records, contact lists (Zhu, Xiong, Ge, & Chen, 2014). It was argued that some consumers might not be aware that app developers use personal data and that they are giving away personal data in exchange for downloading the apps (Buck, Horbel, & Kessler, 2014). Researchers have yet to find conclusive evidence on why consumers are willingly handing over their personal information through apps (Morosan & DeFranco, 2015). Furthermore, many of these apps are connected to third-party sites, and this allows customers' data to be collected and shared by third parties without their consent (Adhikari, Richards, & Scott, 2014). Thus, app developers need to reassure consumers that their apps are safe to install, and users' information will be secured (Harris, Furnell, & Patten, 2015).

Lastly, most studies on consumers' WTP for mobile applications have been carried out in western countries. This creates a need for a study examining WTP in a non-western context, particularly in Malaysia. Despite the high penetration of smartphones and M-commerce among Malaysian consumers, there is little evidence on their willingness to pay for mobile apps. A report by Nielsen (2012) mentioned that

only 31% of Malaysians used paid apps, and there is minimal data found on the mHealth application usage behavior among Malaysians.

Overall, despite some initial research on WTP on various digital technologies, the field of study on WTP toward mHealth app, remains poorly understood and under-examined. In particular, it is not clear whether there is a relationship existing between the attitude, self-efficacy and social influences offered towards the WTP for the mHealth app. While most studies measure social influences as peer review, this study measures social influence by online review and app rating as per suggested by Zhang and Wang (2019). While many contradict findings were found to support the relationship between trust and behavioral intention (Farah, Hasni, & Abbas, 2018; Hajiheydari & Ashkani, 2018; Koksal, 2016), initial trust, one of the most important elements in buying behaviour, are examined as a moderator between the antecedent of attitude and willingness to pay. Initial trust, in this study, was measured as a dimensional construct of privacy and security. Furthermore, self-efficacy, health consciousness, mobile affinity, illness experiences are added as new determinants in the model as suggested by Hsu & Lin, 2015; Kim et al., 2016 and Wang, Lin, Wang, Shih and Wang, 2018. In brief, this research proposes to address these problems by (1) developing and (2) validating a conceptual model of the relationships existing between factors influencings users to pay for mHealth applications in the context of Malaysian population.

1.4 Research Questions

The problems discussed in the previous section pose several important questions worthy of closer examination, which are listed below:

1. What is the relationship between attitude, social influence (app rating and online review), and self-efficacy (mobile self-efficacy and health self-efficacy) toward a user's willingness to pay for a mHealth app?
2. What is the influence of perceived usefulness and perceived ease of use on the attitudes about paying for a mHealth app?
3. Does perceived price and health consciousness influence the perceived usefulness of a mHealth app?
4. Does the initial trust regarding privacy and security moderate the relationship between the user's attitude and his/her willingness to pay for a mHealth app?
5. Are users willing to pay for the mHealth app?
6. Is a user's willingness to pay for a mHealth app influenced by their experiences of being ill, mobile affinity, and personal mobile innovativeness?

1.5 Research Objectives

The primary research objective entails a set of specific interrelated research goals as follows:

1. To examine the relationship between attitude, social influence (app rating and online review), and self-efficacy (mobile self-efficacy and health self-efficacy) toward users' willingness to pay for the mHealth app.
2. To examine the influence of perceived usefulness and perceived ease of use on the attitude to pay for the mHealth app.
3. To examine the influence of perceived price and health consciousness on the perceived usefulness of the mHealth app.
4. To investigate the moderating effect of initial trust (privacy and security) in the relationship between attitude and willingness to pay for the mHealth app

5. To measure users' willingness to pay for the mHealth app.
6. To determine whether the cues to action (experiences of being ill, mobile affinity, and personal mobile innovativeness) affect the user's willingness to pay for mHealth app.

1.6 Significance of the Study

The study will theoretically and practically contribute to the field by integrating various perspectives on the consumer post-behavior towards the willingness to pay for mHealth apps. Considering the above discussion, the significance of this study can be briefly explained from two perspectives;

1.6.1 Theoretical Significance

In contrast to most previous studies that have focused on the initial acceptance of mHealth applications, this research seeks to provide a more robust theoretical knowledge of customers' post-adoption behavior, precisely their willingness to pay to access paid features of mHealth Apps. Numerous past studies have shown that even with high penetration on the adoption of mHealth app technologies, the number of downloads does not promise post-adoption behavior. Most app users tend to remove and discard the app after downloading them, leaving the app economy at high risk.

This study has posed several implications. Firstly, it aims to provide empirical evidence on the determinants for users to pay for an app and will fill the gap in studies regarding the app purchase behavior of mobile apps. This study will be among the first to address the issue faced by app developers, which find it hard to retain current users and getting them to pay to access premium features of freemium and paid apps, particularly in the Malaysian context.

The contributions of this study are manifold. First, the researcher integrates relevant and essential theories (i.e., TAM, TPB and HBM) to develop the proposed model for examining key factors influencing users' willingness to pay in the context of mHealth application. The integration of these theories will provide a more holistic analysis of customer behavioral attitudes.

Second, the key antecedents and consequences of TAM that affect users' attitudes towards WTP for mHealth application are examined. There is no doubt about the effects of TAM factors on intention to purchase, yet, scholars have called for further research into the role of mobile apps in relation to customer behaviour (Lee, 2018). This study also contributes to the growing body of knowledge in TAM theory by extending the elements of perceived usefulness through determining the association between health consciousness and perceived price as the antecedents for perceived usefulness.

In particular, using the TPB, new findings for the WTP literature are added by proposing social influence as a critical antecedent of an individual's WTP. Mobile app platforms provide online virtual communities where users experience a high degree of interaction and communication (e.g., read, post, reply, share resources, star rating). Social influence in this study is measure from the perspective of anonymous influence, which is app rating that shows the overall evaluation of the app and online user reviews.

Third, willingness to pay for mHealth has its own uniqueness as it comprises lots of enhancing features compare to other types of mobile app. However, it is seldomly discussed in works of literature world. Therefore, elements from HBM model such as Health Consciousness and Cues to Action that trigger willingness to pay for health-related application are also tested. Aspects such as Illness experience,

health self-efficacy, and health consciousness are examined to see whether they are important antecedents in driving the consumer's behavior to purchase mHealth apps. Therefore, our findings can offer valuable implications and guidelines for specific mechanisms to willingness to pay for mHealth application.

Fourth, this study will provide further insight into consumers' mobile affinity and personal mobile innovativeness and how these factors affect consumer's decisions. Undoubtedly, the tendency to pay for mHealth applications represents a fundamentally new purchasing context compared to the purchase behaviors of other digital products as these apps contain more sensitive information, which requires further expert validations and supervision. This study added to the knowledge base by shedding light on the apparent initial trust of customers to pay for the mHealth app.

Overall, to the best of researcher knowledge, this study is among the first to explore the willingness of mobile consumers to pay for mHealth applications. Consequently, the results of this study may contribute to the knowledge pertaining to mobile consumer behavior.

1.6.2 Practical Significance

This study has practical significance for app marketers, publishers, and healthcare practitioners. In this light, in most developed countries, smartphone penetration has reached more than 80 %; hence, understanding mobile consumer behavior is a must for the app developers to gain advantages in this extremely competitive environment (Wozniak, Schaffner, Stanoevska-Slabeva, & Lenz-Kesekamp, 2018). Thus, the findings will guide designers on how to enhance consumer behavior and help them understand the importance of individual behavior to maintain their competitiveness. In the meantime, this study will help users understand

the link between social influence and willingness to pay in the context of mobile apps by examining how app ratings and reviews by previous users review influence consumers' purchase decisions. Moreover, as mHealth apps are aimed to provide medical and health-related information, identifying users' perceptions of the apps will help app marketers to segment consumers' behaviors based on WTP decisions. This study also holds practical significance for app developers to understand as it helps identify whether innovativeness and affinity in using mobile technologies will affect the customers' decision to pay for the apps.

Overall, as Malaysia is facing over-crowdedness in hospitals and other medical institutions, and as mentioned, the use of mHealth applications provides a realistic solution for eliminating the need for patients to visit hospitals for non-critical cases. In this light, while there is a huge prospect for the use of mHealth apps among Malaysians, there is yet any information that explores Malaysian customers' willingness to pay for the apps. Thus, the knowledge obtained from this study will reveal Malaysian consumers' willingness to pay for using the apps. The finding can help provide some insights into the post-adoption behaviors of consumers and their willingness to pay and continuously to use the mHealth apps.

1.7 Definition of Key Terms

Below are the definitions of important key terms used in this research.

Smartphone	:	A smartphone is a mobile phone that offers internet connectivity and use apps, "or small-sized applications" for various functions (Taylor & Levin, 2014)

Mobile application / Mobile App	:	A type of software that can be installed on smartphones or tablets to allow users to perform a specific task (Liu et al., 2014)
mHealth App	:	Mobile Health (M-Health or mHealth) apps are applications designed to provide health-related services through mobile (Arslan, 2016)
Willingness to Pay	:	To which extends the users are prepared to pay for the use and downloading new applications (Nikou, Bouwman, & Reuver, 2014)
Attitude	:	The degree to which the user derives positives feelings from using a given app (Hsu & Lin, 2016)
Perceived Price	:	The product's price or cost based on consumers' point of view (Wu et al., 2015)
Health Consciousness	:	The extents to which one integrates his/her health concerns into their daily activities (Jayanti, Burns, 1998)
Perceived Usefulness	:	The extents to which users think that the use of technology is useful, particularly in helping to perform a task (Okumus & Bilgihan, 2014)
Perceived Ease of Use	:	The extent of users' belief that technology should be free of effort, i.e., easy to comprehend or operate (Okumus & Bilgihan, 2014)
App Rating	:	The user's overall assessment of an app (Hsu & Lin, 2015)

Online Review	:	An electronic word-of-mouth review based on the perception of online users (Jiménez & Mendoza, 2013)
Illness Experience	:	Users' self-report of general health status or perceived symptoms, as well as days they experience illnesses (Lee & Han, 2015)
Health Self-Efficacy	:	An individual's' perception towards their ability to manage their health (Sun Young Lee, Hwang, Hawkins, & Pingree, 2008)
Mobile Self-Efficacy	:	How an individual perceives their competence in using a mobile application (Wang et al., 2013)
Personal Mobile Innovativeness	:	An individual's voluntary willingness to try new mobile apps (Wang et al., 2013)
Mobile Affinity	:	How important does the mobile platform to one 's livelihood (Aldás-Manzano, Ruiz-Mafé, & Sanz-Blas, 2009)
Initial Trust	:	The willingness of a person to take risks to fulfill a need without prior experience, or credible, meaningful information (Oliveira, Faria, Thomas, & Popovic, 2014)
Privacy	:	The extent to which confidential information provided during an online transaction is secured against breach or unauthorized use (Escobar-Rodríguez & Carvajal-Trujillo, 2014)

Security	:	How consumers perceived that the app developers and service providers secure their apps through processes like non-repudiation authentication, encryption, and verification (Escobar-Rodríguez & Carvajal-Trujillo, 2014)

1.8 Organizations of the Remaining Chapters

This thesis contains five sections, including this introductory section. The first section introduces the notion of mHealth apps and the research issues and the importance of the study in a particular sense. Chapter 2 reviews the underpinning theories in the context of this study and previous relevant works on the issue being studied. This chapter will also describe all variables included in the research framework and presents the hypotheses formulated. Chapter 3 deals with the research methodology, in particular, research design, data collection procedures, and sampling methods. All preliminary findings are presented in Chapter 4. In the next chapter, Chapter 5 provides the outcomes of the information gathered for this research, while Chapter 6 will discuss the results and related them to various theoretical and empirical evidence to measure users' willingness to pay for the mHealth application. Furthermore, the implication of the findings to future research into this area will be presented. The last chapter will summarise the findings and suggest future directions for research in related areas.