CHAPTER 1: INTRODUCTION

This study tends to examine behavioral intention towards using mobile banking services in Malaysia. This chapter firstly addresses the background and the issues of mobile banking. Then the research questions, the research objectives, the contribution of this study and organization of the chapters of this study are presented.

1.1 Research Background

The rapid development of mobile technology has affected the banking industry globally. An impact of information technology in the banking sector is the introduction of mobile banking. Mobile banking (also known as M-Banking, SMS Banking etc.) is a term used for performing balance checks, account transactions, payments etc. via a mobile device such as a mobile phone. Mobile banking is most often performed via SMS or the Mobile Internet but can also use special programs called clients download to the mobile device.

Mobile and wireless technology is rapidly changing the way personal financial services are designed and delivered. Despite all the efforts aimed at developing easier and better mobile banking systems, these systems can easily remain unnoticed by customers, or are seriously under-use despite their availability. With the improvement of mobile technologies and devices, mobile banking has been considered as a salient system because of such attributes of mobile technologies as ubiquity, convenience and interactivity (Turban, King, Viehland, & Lee, 2006). Nowadays, users are able to conduct banking services from anyplace at anytime and to connect banking service easily and quickly with mobile devices. Banking services are provided interactively

and immediately in mobile banking. In the development of mobile banking, banks enable users to access account balances, pay bills, and transfer funds through mobile phone or other mobile devices, instead of visiting banks and internet banking based on computer.

It indicates a remarkable potential to the banking industry with the increasing of cell phones users in the country. Banks can retain existing banking users in providing a new system (mobile banking) into the existing systems and have an opportunity to convert cell phone users into banking users. Nevertheless, retaining mobile banking users and attracting new ones may not be easy (Devaraj, Fan, & Kohli, 2002; Gefen, Karahanna, & Straub, 2003a). Hence, it is important to understand what factors contribute to users' intention towards using mobile banking. Mobile banking services are still in their infancy, leaving a great deal of room for development in Malaysia. Thus, there is a need to understand users' acceptance of mobile banking and to identify the factors affecting their intentions to use mobile banking. This information can assist providers in the building of mobile banking systems that consumers want to use, or help them discover why potential users avoid using the existing system.

Several behavioral models for explaining/predicting the adoption and usage of information technology have been proposed in the IS literature. These models include the Technology Acceptance Model, the Theory of Reasoned Action, the Theory of Planned Behavior, and the Decomposed Theory of Planned Behavior. Over the last two decades, a significant body of research has focused on identifying various factors that influence user acceptance behavior, advancing several theoretical models. In particular, the technology acceptance model (TAM), introduced by Davis and his

colleagues (Davis et. al, 1989), has received significant attention and has become established as a parsimonious yet coherent and consistent model for explaining and predicting usage intentions and acceptance behavior.

1.2 Research Problem

Driven by the increasing mobility of today's modern society, the number of mobile phone accounts has sharply increased in recent years and the mobile telephony industry has grown significantly. Hence, mobile services have increasingly been a part of everyday life (Hwang et al., 2007). Mobile banking or mobile commerce has been a huge success in terms of adoption by individuals in some markets like Japan, though, surprisingly, not as flourishing in others. The penetration rate for mobile phone with mobile internet capabilities in Asia Pacific (exclude Japan) is only about 4% in 2007 and 5% in 2008 while Japan is having the penetration rate at 72% in 2007 and 84% in 2008 (Morgan Stanley, Dec 2009). This directly reflects the mobile banking adoption rate in Malaysia is relatively low as compare to Japan. This is in consistent with the report shown that internet banking adaptation in Malaysia is relatively low and there is little research to understand the key adaptation determinants during its infancy (Ndubisi et al., 2004). This issue has drawn a lot of attention from researchers to identify and understand the factors that drive individuals' adoption/rejection of this innovation.

Many authors (Pedersen et. al, 2002, 2003; Lu et. al, 2003; Kim et. al, 2005; Nysveen, et. al, 2005) have pointed out that traditional adoption models and theories such as Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB) and the Diffusion of Innovation (DOI) theory are insufficient to gain a comprehensive

explanation of the factors that affect individuals' intentions to adopt or reject the use of mobile banking services.

One of the major reasons for this insufficiency lies in the kind of roles played by mobile banking services users compared to roles played by users of traditional technologies such as PCs. Traditional technology users have mainly been studied in terms of their role as technology users through their interaction with the technology itself and as network members through interaction with other people. Users of mobile banking services, on the other hand, play a threefold role: as technology users, as network members, and as consumers (Kim et. al., 2005; Pedersen et. al, 2002). Thus, to fully understand individuals' intention to adopt mobile banking, these three roles or perspectives have to be incorporated.

An important goal throughout is to develop a model capable of providing useful information to mobile banking practitioners. It will help the practitioners to have an insights understanding and how to efficiently promote it to customers. Factors from various theories are combined to develop a proposed model in this research. This study extends the existing models applicability to the context of mobile banking by adding trust-based construct (perceived credibility) and risk-based construct (perceived risk) to the model with careful attention to the placing of these constructs within the TAM and TPB's existing structure.

1.3 Research Questions

Although cell phones and PDAs with mobile technology are becoming more readily available in Malaysia, the number of users who choose to adopt such technologies is

still relatively low compared to other countries. While cell phone companies are upgrading networks to the 3G or 3.5G standard, providing adequate coverage in major city areas and providing consumers with content, this study validates the determinants factors towards mobile banking services. The following research questions have been derived:

1. What factors determine behavioral intention towards mobile banking among the consumers in Malaysia?
2. What are relationships among the constructs of acceptance behavior for mobile banking services?

1.4 Research Objectives

The objective of this study is to examine factors that impact the adoption or acceptance of mobile banking services in Malaysia. Following the research questions to be answered in this study, the objectives of the study are addressed as follows:

1. To identify the important determinants that allow individual to adopt mobile banking service
2. To examine the relationships among the constructs of acceptance behavior for mobile banking services. The constructs in this study are Perceived Ease of Use, Perceived Usefulness, Perceived Credibility, Subjective Norm, Perceived Behavioral Control, Perceived Risk, Attitude and Intention to use.

1.5 Contribution of the Study

This study has integrated different factors from previous research to study behavioral intention towards mobile banking among Malaysia consumers. The findings of this

study provide a good basis for industry developing a service evaluation framework to determine the adoption potential of new mobile services. It is believed that the findings of this study will broaden the current knowledge on technology acceptance in mobile banking services. Furthermore, the study may provide deeper insights into strategies and planning needed in encouraging or attracting the potential users to accept this emerging technology.

As a result of accelerated business competition and the popularity of internet and mobile devices use in the market recently, it is necessary for the Malaysia mobile banking providers to realize what factors influencing behavioral intention towards using mobile banking services. This will help the management in developing effective strategies to ensure financial institutions to remain competitive and retain their customers in long term.

1.6 Organization of the Study

The study contains five chapters and the summary for each chapter is described as follows.

The study begins with Chapter One which outlines the introduction of the research. It consists of research background, research problem, research questions and research objectives. Significance of the study and organization of the study are also addressed.

Chapter Two introduces the previous literature related to perceived ease of use, perceived usefulness, perceived credibility, subjective norms, perceived risk, attitude

and behavioral intention toward mobile banking. The research constructs and their relationships are identified respectively.

Chapter Three presents a research model that suggests the integrative interrelationships among the research constructs in which it includes perceived ease of use, perceived usefulness, perceived credibility, subjective norms, perceived risk and attitude with behavioral intention toward mobile banking. Meanwhile, the development of hypotheses is addressed as well. The research type, questionnaire design and construct measurement, sampling and data analysis procedure are also discussed in this section.

Chapter Four discusses the pre-analysis data screening results (normality and regression assumption test), the reliability test and validity assessment of the instrument. The research outcomes which derived from multiple regression analysis are also reported here which consist of the findings on determinants of behavioral intention towards mobile banking.

Chapter Five is a conclusion of the findings and implications of the study. Research limitations and recommendations are stated as well.

Bibliographies and appendices are included in the end of the paper.

CHAPTER 2: LITERATURE REVIEW

This chapter firstly reviews the theoretical foundation and theoretical background. Then concludes definitions of each research construct and the interrelationships among research constructs are finally described.

2.1 Theoretical Foundation

This section discusses the models and shows how they are used in adoption of mobile services research. Three models of IS adoption behavior appear as the most widely applied when explaining ICT-adoption. There are the technology acceptance model (TAM) (Davis, 1989), the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) and the extension of TRA into a theory of planned behavior (TPB) (Ajzen, 1985).

2.1.1 Technology Acceptance Model

Technology Acceptance Model (TAM) (Davis 1989, Davis et al. 1989) is the most widely applied model of user acceptance and usage intention. TAM was adapted from the Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980, Fishbein and Ajzen 1975). The TAM posits that a user's adoption of a new information system is determined by that user's intention toward using the system. TAM theorizes two critical beliefs determining a user's adoption intention towards using information technology, which are perceived ease of use and perceived usefulness. The first belief, perceived ease of use is defined as "the degree of to which a person believes that using a particular system would be free of effort" while the second belief, perceived

usefulness is defined as "the degree to which a person believes using a particular system would enhance his or her job performance" (Davis, 1989). The technology acceptance model (TAM) (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) has received significant attention in IT/IS acceptance literature. According to the TAM, system usage behavior is determined by the behavioral intention towards using a particular system, which in turn, is determined by the perceived usefulness and perceived ease of use of the system.

TAM has many strengths including its specific focus on IS use, its basis in social psychology theory, the validity and reliability of its instruments and its parsimony. However, one of its limitations is the assumption that its use is volitional. In other words, there are no barriers to prevent an individual from using an IS if he or she chose to do so (Mathieson, Peacock, & Chin, 2001). TAM theorizes that perceived usefulness and ease of use mediate the relationship between external variables, such as system characteristics, development process, training, and intention to use a system (Venkatesh & Davis, 2000). Thus, perceived usefulness and ease of use are user's beliefs on information technology. Therefore user's attitude toward technology is formed which in turn, predict users' acceptance (intention to use technology). The original TAM consists of perceived ease of use, perceived usefulness, attitude toward usage, behavioral intention to use, and actual system use.

Subsequent research by Venkatesh (1996) refined the TAM suggesting that the mediating effect of attitude could be excluded as empirical evidence found that the attitude element did not fully mediate the effect of perceived usefulness and perceived ease of use on intention to use. Attitude towards using a technology was omitted by

Davis et al. (1989) in their final model because of partial mediation of the impact of beliefs on intention by attitude, a weak direct link between perceived usefulness and attitude, and a strong direct link between perceived usefulness and intention.

TAM provides an inexpensive and quick way to gather information about individual's perception of a system. However, it is insufficient to explain an individual's technology acceptance just by the key constructs of TAM such as perceived ease of use and perceived usefulness (Mathieson, 1991). In order to explain users' acceptance in more details, TAM has been extended in addition to determinants of the key constructs, and another key constructs of behavioral intention across a wide range of IT.

There are some previous studies have extended the TAM with constructs such as cognitive absorption (Agarwal and Karahanna, 2000), perceived playfulness (Moon and Kim, 2001) and product involvement and perceived enjoyment (Koufaris, 2002). Wang et al. (2003) also successfully introduced a trust-related construct, perceived credibility, as a new TAM factor to reflect the user's security and privacy concerns in the acceptance of online banking while Gefen et al. (2003) added a trust construct to the TAM in an online shopping context. Considering the context similarity between internet banking and mobile banking, this study extends TAM by adding perceived credibility to the model.

2.1.2 Theory of Reason Action

The theory of reasoned action (TRA), proposed by Fishbein & Ajzen (1975), is a well-established model that has been used broadly to predict and explain human

behavior in various domains. TRA is a more general theory than TAM, and has been applied to explain behavior beyond the adoption of technology. However, when applied to adoption behavior, the model includes four general concepts which are behavioral attitudes, subjective norms, intention to use and actual use. The inclusion of subjective norm represents an important addition when compared to TAM. According to the TRA, the most important determinant of a person's behavior is behavioral intention to use (BITU). Behavioral intention is defined as the strength of one's intention to perform a specified behavior. A person's intention to perform a behavior is a combination of (1) the attitude towards performing the behavior and (2) his or her subjective norm.

TRA has been applied in its original form to explain the adoption of ICT-applications but typically TRA is used as a basis for modifying the TAM model with subjective norm as suggested above (Venkatesh & Davis, 2000; Venkatesh & Morris, 2000). TRA has been successfully applied to predict behavior and intention in a variety of subject areas.

Although the TRA and the TAM share many issues, they have some considerable differences. First, TRA beliefs are bound to context and hence they cannot be generalized. On the contrary, TAM states that perceived usefulness (PU) and perceived ease of use (PEOU) are issues that have an effect on acceptance of all IS. The other significant difference is that in TRA all beliefs are summed together, but in the TAM both beliefs are seen as distinct constructs. Davis et. al (1989) proposed that modeling each belief separately will allow researchers to better trace influences of all of the affecting factors on information systems acceptance.

2.1.3 Theory of Planned Behavior

The theory of planned behavior extends from TRA by incorporating an additional construct, namely perceived behavior control (BC), to account for situations in which an individual lacks substantial control over the targeted behavior (Ajzen, 1991). The development of TPB is originally based on the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) which is designed to explain almost any human behavior and has been proven successful in predicting and explaining human behavior across various application contexts (Davis et. al, 1989). According to TPB, an individual's behavior can be explained by his or her behavioral intention, which is jointly influenced by attitude to use, subjective norms and perceived behavioral control.

Models based upon TPB have been applied to the explanation of different types of behavior, but when applied to the adoption of ICT systems or services, the model contains five concepts which are attitudes, subjective norm, behavioral control, behavioral intention to use and actual use. Based on the theory, both attitude toward behavior and subjective norms are immediate predictors of intention to perform behavior. Attitude towards using refers to "the degree of a person's favorable or unfavorable evaluation or appraisal of the behavior in question" (Fishbein & Ajzen, 1975). Subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991). In other words, subjective norm is related to the normative beliefs about the expectation from other people. The TPB further proposes that intention to perform behavior is the proximal cause of such behavior. Intentions represent motivational components of behavior, that is, the degree of conscious effort that a person will exert in order to perform behavior. Perceived behavioral control

refers to “people’s perception of ease or difficulty in performing the behavior of interest”. It is associated with the beliefs about the presence of control factors that may hinder or facilitate the performance of the behavior (Ajzen, 2002).

The theory of planned behavior extends the TRA model by incorporating an additional construct, namely perceived behavior control as the third model, to account for situations in which an individual lacks substantial control over the targeted behavior (Ajzen, 1991). TPB has been successful in variety of subject areas for predicting the performance of actual behavior and behavioral intention. Ajzen, (1991) proposed that attitudes toward behavior, subjective norms and perceived behavioral control are generally found to be able to accurately determine individual behavioral intentions. The theory of perceived risk has been further applied to explain consumer’s behavior in decision making since the 1960s (Taylor, 1974). People are anxious about the diverse types of risks presented when engaging in online activities or transactions with the increasingly high penetration rate of internet and mobile applications. Winfield (2000) and Forsythe (2003) have both proposed that perceived risk is incorporated as a direct antecedent of behavioral intention to use as intention to use a website for transactions involves a certain degree of uncertainty.

2.2 Theoretical Background

In this section, a review of theoretical background of perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude toward use and behavioral intention to use will be presented.

2.2.1 Perceived ease of use and Behavioral Intention

By definition, perceived ease of use is defined as the degree to which a person believed that using a particular system would be free of effort (Davis, 1989). In order to prevent the "under-used" system problem, mobile banking system must be both easy to learn and easy to use. According to the technology acceptance model (Davis et. al., 1989), perceived ease of use is another key antecedent of behavioral intention to use technology besides perceived usefulness (Moon et. al, 2001; O'Cass et. al, 2003). Previous extensive research by Karahanna et. al. (1999) provides evidence that ease of use had a significant positive effect on behavioral intention to use the system among the potential adopters. Likewise, bank customers are likely to adopt mobile banking when it is easy to use the technology (Guriting & Ndubisi, 2006).

Given the technical limitations of mobile devices, ease of use becomes an imminent acceptance driver of mobile applications (Venkatesh 2000). This is especially true for mobile banking services, which compete with established internet solutions and thus need to provide benefits when it comes to ease of use. Important aspects related to mobile banking services ease of use include, for example, clear symbols and function keys, few and simple payment process steps, graphic display, and help functions (Pagani & Schipani 2005).

In TAM, an individual's belief determines the behavioral intention to use the system. Users are actually willing to use mobile banking when they perceive it to be useful and helpful for the efficiency of their work. However, users will not use it when they perceive it to be difficult to use, even if it may be useful for their work. Perceived ease of use has been found to be significant antecedent of intention to use a system in

previous extended TAM research (Agarwal & Karahanna, 2000; Venkatesh & Morris, 2002; Venkatesh & Davis, 1996, 2000). Based on these findings, it is highly predictable that the general causalities found in TAM also applicable to mobile banking services.

2.2.2 Perceived Usefulness and Behavioral Intention

Perceived usefulness and perceived ease of use are both fundamental elements of TAM. Perceived usefulness is strongly associated with productivity. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis et. al, 1989). It suggests that using computers in the workplace would improve job performance, increase user's productivity, and enhance job effectiveness and usefulness. There are extensive researches in the IS community that provide evidence of the significant effect of perceived usefulness on usage intention (Agarwal & Prasad, 1999; Davis et. al., 1989; Hu et. al., 1999; Venkatesh & Morris, 2000)

One of the main reasons for the slow diffusion of mobile applications in general and mobile payment in particular could be a failure in communicating a clear benefit to potential users. According to diffusion theory, users are only willing to accept innovations if those innovations provide a unique advantage compared to existing solutions (Rogers 1995). In the context of TAM, this view is reflected by the perceived usefulness construct.

The ultimate reason people exploit mobile banking systems is that they find them useful. J.-C. Gu (2009) reflects consumer perceived usefulness (PU) influence

behavioral intention to use mobile banking in Korea. Luarn and Lin (2005) successfully applied the TAM in a new IS context such as mobile banking. Consistent with previous studies, perceived usefulness and perceived ease of use were found to be significant antecedents of the behavioral intention to use mobile banking. These studies confirm perceived usefulness as the important effect in understanding individual responses to information technology. The more useful and easier the system is, the more it will be used. Therefore, it is highly predictable that people use mobile services because they find it useful.

2.2.3 Perceived Credibility and Behavioral Intention

Besides the perceived usefulness and perceived ease of use in TAM, the usage intention of mobile banking can also be affected by the security and privacy concerns of the users. According to Wang et al. (2003), perceived credibility is defined as the extent to which a person believes that the use of mobile banking will have no security or privacy threats. Wang et al. (2003) have conceptually distinguished perceived credibility from perceived risk (e.g., Liao, Shao, Wang, & Chen, 1999) and trust (e.g., Gefen et al., 2003) and found that perceived credibility had a significant positive influence on the behavioral intention to use mobile banking. Furthermore, in the study of Luarn and Lin (2005), they found that perceived credibility has a significant impact on the development of willingness to use mobile banking.

Perceived credibility is usually impersonal and relies on reputation, information and economic reasoning (Ba and Pavlou, 2002). The importance of security and privacy to the acceptance of banking technologies has been noted in many banking studies (Howcoft et al., 2002; Polatoglu and Ekin, 2001; and Sathye, 1999). It reflects

consumers' perception regarding the online transaction's security and trust issues (Wang et al., 2003).

Basically, fear of the lack of security is recognized as an important factor impacting the acceptance of mobile banking. In general, the perceived credibility that people have in the system, to securely conclude their transactions and maintain the privacy of their personal information will affects their voluntary acceptance of mobile banking. As mobile banking is somewhat new, perceived credibility has the higher ability to predict and explain the intention of users to adopt mobile banking. In short, definition of perceived credibility in this study is deemed as one of the assessment by the consumers on their perception relative to the behavioral intention to use mobile banking.

2.2.4 Subjective Norms and Behavioral Intention

Subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991). In other words, subjective norm is related to the normative beliefs about the expectation from other people developed through external and interpersonal influence. Thompson, Higgins and Howell, 1994 argued that subjective norm is a social factor. Triandis, 1971 defines social factors as a general construct that reflects individual norms, roles, and values, which are in turn influenced by subjective culture variables including referent group. The reason people exploit mobile banking is that they are encouraged to use mobile banking by the people around them. In the study of Nysveen *et al.* (2005), normative pressure is found to be an important construct that accounts for the success of IS. The result demonstrates that people will consider using mobile banking services because these

services are important tools in displaying personal and social identity. Similarly, in the study of Kleijnen et al. (2005) on wireless finance in the Netherlands, subjective norms were significant in the development of people's intention to use it.

The work of Venkatesh and Morris (2000) was conducted in the context of technology usage in a workplace. Mobile banking is more often used as a new means of banking transaction where social pressure may be even more prominent among customers to distinguish themselves from the others. In society at large, there is the assumption that people will be seen to be special and gain a personal and social identity with the adoption of mobile banking (Nysveen et al., 2005). Venkatesh & Davis (2000) find subjective norms to have a direct positive effect on intention to use the mobile banking services. Teo & Pok (2003) reveal the importance of subjective norms on intention to use mobile services. In a recent study, Venkatesh & Davis (2000) also found strong support for a direct link between subjective norm and behavioral intention to use in a longitudinal study pooling results across four different studies and settings.

2.2.5 Behavioral Control and Behavioral Intention

Perceived behavioral control refers to "people's perception of ease or difficulty in performing the behavior of interest". Perceived behavioral control plays an important part in the theory of planned behavior. In fact, the theory of planned behavior differs from the theory of reasoned action in its addition of perceived behavioral control. Perceived behavioral control has been shown to have an effect on key dependent variables such as intention and behavior in a variety of domains as according to the theory of planned behavior (Ajzen 1991). It is consistent with the previous study by

Ajzen (2002) about the presence of control factors that may hinder or facilitate the performance of the behavior. Mathieson (1991) also found that control was a significant determinant of intention to adopt technology.

Perceived behavioral control is directly related to both intention to use and actual use, and reflects the internal and external constraints on behavior. Ajzen & Madden (1986) differentiated between internal and external perceived behavioral control factors. Ajzen (1988) explained that internal control factors are factors relating to individual disposition and include the amount of information a person has, along with that person's skills, abilities, emotions and compulsions concerning a specific behavior. Meanwhile, the external control factors determine the extent to which circumstances facilitate or interfere with the performance of the behavior. Generally, perceived behavioral control is composed of elements of individual constraints that are related to the individual user's experience, economy, and skill in using a service. In other words, a person will experience greater control if he or she has resources or abilities to use mobile services, and thus the probability for using the service will be higher and would predict the intention to use the service.

2.2.6 Perceived Risk and Behavioral Intention

The theory of perceived risk has been applied to explain consumer's behavior in decision making since 1960s (Taylor, 1974). Pavlou (2001) defines perceived risk as "the user's subjective expectation of suffering a loss in pursuit of a desired outcome". Customers may worry about an unjustifiable delay in product delivery, providing payment without receiving the product and other illegal activities and fraud when they are uncertain about product brands, quality and online services. In the study of

innovation diffusion and adoption, perceived risk was first introduced in marketing research as an external variable (Frambach, 1993, 1995; Ostlund, 1974). Frambach (1993, 1995) reveals that the speed of adoption is negatively related to the level of perceived risk.

The perceived risk surrounding an innovation might cause a potential adopter to postpone the decision to either accept or reject the adoption. A previous study by Ostlund (1974) introduces risk as an additional measurement in IT adoption. Perceived risk has also been found to be a particularly critical concern among consumers in the context of electronic services (Lwin et al. 2007). Sathye (1999) confirmed security concerns are a burning issue for financial transactions done over the internet.

People are anxious about the diverse types of risks presented when engaging in online activities or transactions in accordance with the increasingly high penetration rate of internet and mobile applications. Perceived risks were primarily regarded as fraud and product quality in the past. The definition of perceived risk has changed since online transactions became popular. Forsythe (2003) defines that perceived risk refers to certain types of financial, product performance, social, psychological, physical, or time risks when consumers make transactions online today.

Financial risk represents the financial loss in using mobile services, as consumers may perceive that reversing a transaction, stopping a payment after discovering a mistake, or a refund may not be possible. Social risk refers to the older generation who may disapprove of the use of mobile services due to their perception that non-mobile

services are personal and friendly. Performance risk in mobile services is less satisfying than non-mobile services, as consumer may perceive that mobile services cannot be used to complete a transaction when needed due to the denial of access to their account. Physical risk in mobile services refers to potential injury when personal information is accessed by a third party. Psychological risk implies that the use of mobile services would lower their self-image, or have a negative effect on their perceived image from other consumers. Time risk in mobile services represents consumer perceptions that it takes more time to complete a transaction than a non-mobile services transaction (Christopher et. al, 2006). This had led many people to view mobile transactions and even internet application as risk undertakings.

According to the theory of reasonable action, consumers would be willing to transact when their risk perceptions were low. Lowering perceived risks associated with online transactions as well as maintaining transaction trust is vital keys to attracting and retaining customers (Verhagen & Tan, 2004). Hence, customers will adopt mobile services only if they perceive it as being low-risk. Perceived risk is incorporated as a direct antecedent of behavioral intention to use as intention to use involves a certain degree of uncertainty,

2.2.7 Attitude to Use and Behavioral Intention

Attitude is defined as "the degree of a person's favorable or unfavorable evaluation or appraisal of the behavior in question" (Fishbein & Ajzen, 1975). Fishbein & Ajzen (1975) refers the nature of attitude as "Attitude is learned, it predisposes action, and such actions are consistently favorable or unfavorable toward the object". Fishbein & Ajzen (1975) further describe that a person's attitude towards a behavior is in turn

determined by the person's salient beliefs that the behavior will lead to certain outcomes and the evaluation of the desirability of these outcomes as according to Theory Reasoned Action. Ajzen (1991) proposed that a favorable or unfavorable attitude has a direct proportion to the strength of the behavioral beliefs and can be formulated with an expectancy-value model. Beliefs are defined as the "individual's subjective probability that performance of a given behavior will result in a given consequence".

Intention is defined as "the strength of one's intention to perform a specified behavior" while intention to use the service is based on the behavioral intention (Fishbein & Ajzen, 1975). Behavioral intention refers to "a person's intentions to perform various behaviors" and the strength of an intention is explained by "the person's subjective probability that he will perform the behavior in question" (Fishbein & Ajzen, 1975). According to TPB, behavioral intention is formed by one's attitude, subjective norm and perceived behavioral control which reflects perceptions of internal and external constraints on behavior (Ajzen, 1991). Intention refers to "a psychological construct distinct from attitude, which represents the person's motivation in the sense of his or her conscious plan to exert effort to carry out a behavior" as according to Eagly & Chaiken (1993.

The relationship between attitude and behavioral intention is fundamental to TPB, TRA and TAM. In consistent with previous researches by Hung et. al (2002) and Lai (2002), there are positive relations between the constructs in the studies of mobile service usage. Nysveen et. al (2005) investigates the consumers' intention to use mobile services, which shows the four overall influences on usage intention which are

attitudinal influences, motivational influences, normative pressure, and perceived control. In general, attitudes are believed to be the results of personal and social influences. Technology Acceptance Model (TAM) has been widely used to predict user acceptance. An individual's belief determines the attitude toward using the system. Then the attitude develops the intention to use in turn. This intention influences the decision of actual technology usage (Davis, 1989). Behavioral intention within the TRA is determined by attitude and subjective norm, and it has been considered to be a cognitive component of attitude. Most applications of TPB in contexts related to information technology acceptance or adoption have revealed the relatively significant links between attitude and behavioral intention, as well as specific behavior. It is related to behavioral intention because people form intentions to perform behaviors toward which they have positive feeling. Attitude also positively influences behavioral intention (Bruner & Kumar, 2005; Hung et al., 2003; Liao et al., 2007; Teo & Pok, 2003).

The main dependent variable in studies building on the TAM is intention to use (van der Heijden 2003; Venkatesh et al. 2003), defined as the likelihood that an individual will use a technology. According to the TAM, the main antecedent and key mediator of the influence of other variables on intention to use is a person's attitude towards using a technology (Davis 1989; Davis et al., 1989), the degree to which using a technology is positively or negatively valued by an individual. A positive relationship between the two constructs, intention to use and attitude towards using a technology has been found in a number of previous studies (Yang & Yoo 2004).

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

This chapter first introduces the research design, conceptual model and hypotheses developed to be tested. Then, the research methodology is including the questionnaire design and measurement of the research constructs (including perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude and intention to use), sampling and data analysis procedures are described.

3.1 Research Design

This study examines user acceptance by considering intention to use rather than actual because mobile banking is still at an early stage. The research conducted in this study is a descriptive study where the study is undertaken to describe the answers to questions of the factors in determining behavioral intention to use mobile banking in Malaysia and, which of the factors play the most important role to achieve behavioral intention.

The research strategy is a quantitative approach, which is also referring to a positivism paradigm. Positivism is an approach to social research that seeks to apply the natural science model of research to investigations of social phenomena and explanations of the social world (Denscombe, 2003). The questionnaire was employed to collect data for the constructs of the research model. All research variables' items were originally adopted from prior research, and are well founded in the adoption literature review, whereas some appropriate revisions were applied to make the

measurement to fit the research context for adaptation to use mobile banking. The measure of each theoretical construct consisted of multiple statements utilizing a 7-point Likert scale ranging from one (strongly disagree) to seven (strongly agree) to collect the data and examine participants responses to these statements.

3.2 Research Model

Many researchers have investigated and agreed that perceived usefulness and perceived ease of use are valid constructs in influencing an individual's intention to adopt information system (IS) (Guriting and Ndubisi, 2006; Luarn and Lin, 2005; and Wang *et al*., 2003). However, depending on the specific technology context, additional constructs are required to better reflect the application of emerging technologies.

Based on the literatures presented in Chapter 2, a conceptual model has been developed which consists of the variables of determinants of behavioral intention to use mobile banking in Malaysia. The adoption of technological products and services is often explained by the TAM (Davis, 1989). TAM is at present a preeminent theory of technology acceptance in Information System (IS) research. This model has also been applied for understanding the adoption of mobile services (Lee et. al, 2002). In studies on the adoption of mobile services, results have fairly well complied with central factors in the TAM: perceived ease of use and perceived usefulness (Pagani, 2004; Teo & Pok, 2003). In these studies, TAM was generally found to be valid in predicting user acceptance of various information systems.

Besides the perceived usefulness and perceived ease of use, the usage intention of mobile banking can also be affected by the security and privacy concerns of the users. The construct of perceived credibility, proposed by (Wang et. al, 2003), therefore been included in the extended TAM to explore users' acceptance of mobile banking. Ajzen, (1991) proposed subjective norms, perceptions of behavioral control and attitude are generally found to be able to accurately predict individual behavioral intentions.

The research model is summarized as in Figure 3.1 below:

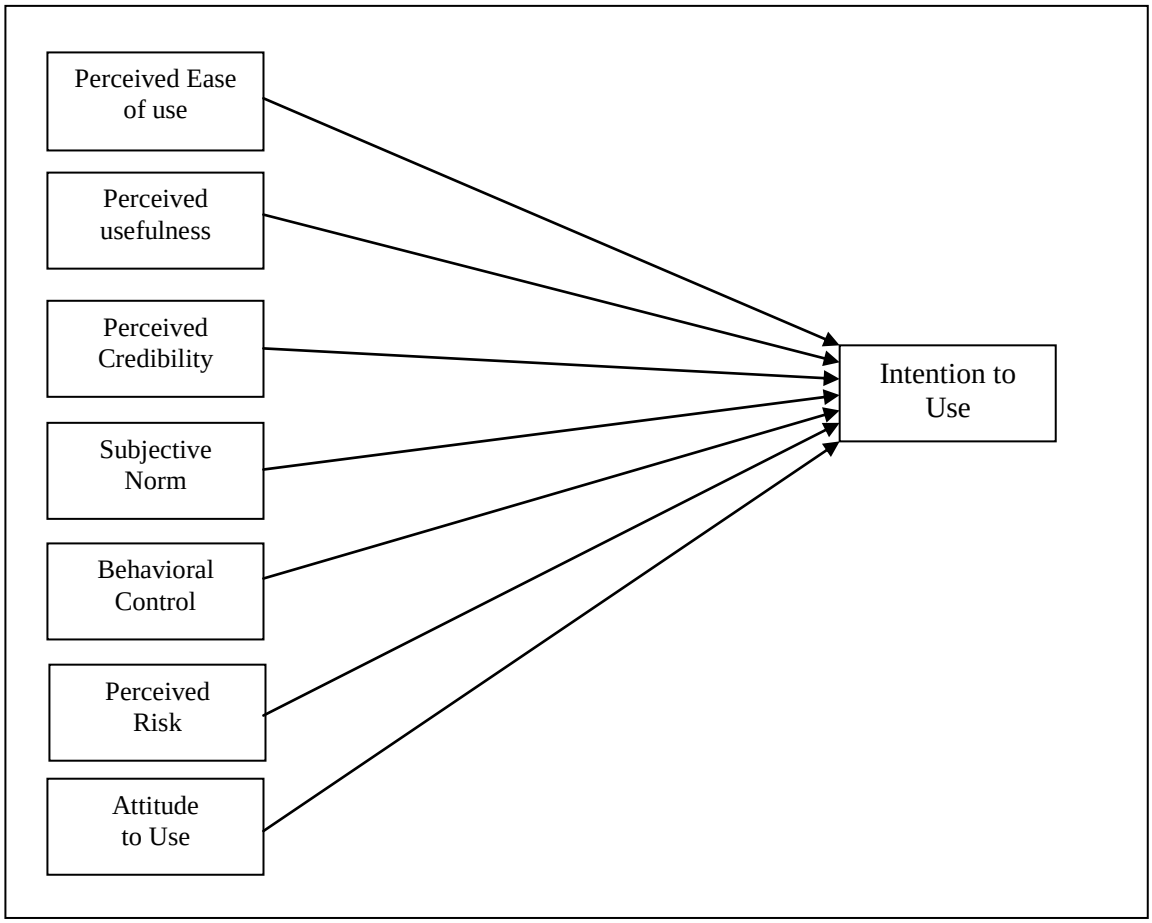

Figure 3.1: *Research Framework*

Subjective norms, perceived behavioral control and attitude constructs are recruited from TPB to capture the effects of normative beliefs in the social system and personal psychological state respectively. People are anxious about the diverse types of risks presented when engaging in wireless activities or transactions in accordance with the increasingly high penetration rate of mobile applications. Other previous researches also revealed that perceived risk is an important determinant of consumers' attitude toward online transactions. Perceived risk is incorporated as a direct antecedent of behavioral intention to use since intention to use a website for transactions involves a certain degree of uncertainty (Winfield, 2000; Forsythe, 2003).

3.3 Research Hypotheses

The section discusses the relationships existing between the perceived ease of use, perceived usefulness, perceived credibility, perceived behavioral control, perceived risk, subjective norm, attitude and behavior intention to use. The research model was built on the integration of the extended Technology Acceptance Model (TAM) model and Theory of Planned Behavior (TPB) model.

As discussed in the literature review of Chapter 2, perceived ease of use is defined as the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). A positive effect of perceived ease of use on intention to use information systems is revealed in a number of previous studies using TAM. Extensive research over the past decade provides evidence of the significant effect of perceived ease of use on behavioral intention (Karahanna et. al, 1999; Taylor & Todd, 1995; Lau, 2002; Davis, 1989). Karahanna et al. (1999) found that perceived ease of

use had a significant positive effect on behavioral intention with attitude excluded as mediator.

Earlier studies have shown that there is a positive relationship between perceived ease of use and system usage intention. Previous research found that perceived ease of use had a significant positive effect on behavioral intention to use mobile banking in Malaysia (Guriting & Ndubisi, 2006). Similarly, it's concluded that perceived ease of use was a significant measure in the development of people's intention to use wireless finance in the study about wireless finance in Netherlands (Kleijnen et. al, 2004). Ramayah et al. (2003) showed that perceived ease of use has a significant impact on the development of initial willingness to use internet banking. The result strengthens the findings by Wang et al. (2003), Adams et al. (1992), Davis et al. (1989) and Ramayah et al. (2002). Results from previous studies revealed a significant relationship between perceived ease of use and perceived usefulness (Kleijnen et al., 2004; Wang et al., 2003; and Davis et al., 1989). According to these findings, it is highly predictable that the general relationships found in TAM are also applicable to mobile banking. As a consequence, the first hypothesis is suggested as follows:

> *H1: Perceived ease of use has a positive effect on behavioral intention to use mobile banking services.*

Refer to Chapter 2, perceived usefulness is defined as the degrees to which a person believes that using a particular system would enhance his or her job performance (Davis et. al, 1989). There is also extensive research in the IS community that provides evidence of the significant effect of perceived usefulness on usage intention (Agarwal & Prasad, 1999; Davis et al., 1989; Hu et al., 1999; Jackson et al., 1997;

Venkatesh, 1999, 2000; Venkatesh & Davis, 1996, 2000; Venkatesh & Morris, 2000). Luarn and Lin (2005) successfully applied the TAM in a new IS context such as mobile banking.

This research model adopts the causality of TAM, that is, perceived usefulness influences behavioral intention. Consumers are actually willing to use mobile banking when they perceive it to be useful and helpful for the efficiency of their work. However, users will not use it when they perceive it to be difficult to use, even though it may be useful for their work. The ultimate reason people exploit mobile banking systems is that they find them helpful and useful. The more useful and easier mobile banking is, the more it will be accepted by the consumers. J.-C. Gu (2009) reflects consumer perceived usefulness (PU) influence behavioral intention to use mobile banking in Korea. In order to better understand the explanatory power of perceived ease of use and perceived usefulness on behavioral intention, second hypothesis is proposed as below:

> *H2: Perceived usefulness has a positive effect on behavioral intention to use mobile banking services.*

Perceived credibility as discussed in Chapter 2, is one's judgment on the privacy and security issues of mobile banking. The importance of security and privacy to the acceptance of banking technologies has been noted in many banking studies (Howcroft et. al, 2002; Polatoglu & Ekin, 2001; and Sathye, 1990).

Wang et al. (2003) found that perceived credibility had a significant positive influence on the behavioral intention to use internet banking. In the study conducted by Wang et

al. (2003), perceived credibility is defined as the extent to which a person believes that the use of mobile banking will have no security or privacy threats. In general, the perceived credibility that people have in the system which to securely conclude their transactions and maintain the privacy of their personal information, affects their voluntary acceptance of mobile banking. In light of the above researches, the third hypothesis is proposed as below:

H3: Perceived credibility has a positive effect on intention to use mobile banking services.

Subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991). In other words, subjective norm is related to the normative beliefs about the expectation from other people developed through external and interpersonal influence. In theory reasoned action (Ajzen & Fishbein, 1980, p.302) and theory planned behavior (Ajzen, 1991) social influence was tested as subjective norms on behavioral intention. Social influences were defined as the effect of other people's opinion, superior influence, and peer influence (Taylor & Todd, 1995).

In a recent study, Venkatesh & Davis (2000) also found strong support for a direct link between subjective norm and behavioral intention to use in a longitudinal study pooling results across four different studies and settings. Thus, the following hypothesis is proposed:

H4: Subjective norms have a positive effect on intention to use mobile banking services.

Perceived behavioral control as discussed in Chapter 2, is referring to "people's perception of ease or difficulty in performing the behavior of interest". Perceived behavioral control plays an important part in the theory of planned behavior. According to the theory of planned behavior, perceived behavioral control has been shown to have an effect on key dependent variables such as intention and behavior in a variety of domains (Ajzen 1991).

Generally, perceived behavioral control is composed of elements of individual constraints that are related to the individual user's economy, experience, and skill in using a service. In other words, if a person has resources or abilities to use mobile services, he will experience greater control, and thus the probability for using the service will be higher and would determine the behavioral intention to use the service. Therefore, the following hypothesis is proposed:

> *H5: Perceived behavioral control has a positive effect on intention to use mobile banking services.*

Refer to Chapter 2, Pavlou (2001) defines perceived risk as "the user's subjective expectation of suffering a loss in pursuit of a desired outcome". Some users perceive potential risks from immature technology while others hesitate to adopt mobile banking services before trusting mobile transactions and other mobile activities. The theory of perceived risk has been applied to explain consumer's behavior in decision making since the 1960s (Taylor, 1974).

The theory of reasonable action predicts that consumers would be willing to transact online if their risk perceptions were low. Lowering perceived risks associated with

online transactions as well as maintaining transaction trust is vital keys to attracting and retaining customers (Verhagen & Tan, 2004). Thus, customers will adopt mobile services only when they perceive it as being low-risk. Since intention to use involves a certain degree of uncertainty, perceived risk is incorporated as a direct antecedent of behavioral intention to use. Therefore, the following hypothesis is proposed:

H6: Perceived risk has a negative effect on intention to use mobile banking services.

Based on Chapter 2, attitude refers to "the degree of a person's favorable or unfavorable evaluation or appraisal of the behavior in question" (Fishbein & Ajzen, 1975). The main dependent variable in studies building on the TAM is intention to use (van der Heijden 2003; Venkatesh et al. 2003), defined as the likelihood that an individual will use a technology.

According to the TAM, the main antecedent and key mediator of the influence of other variables on intention to use is a person's attitude towards using a technology (Davis 1989; Davis et al. 1989), the degree to which using a technology is positively or negatively valued by an individual. A positive relationship between the two constructs - intentions to use and attitude towards using a technology has been found in a number of previous studies (Yang & Yoo 2004). Thus, the following hypothesis is proposed:

H7: Attitude has a positive effect on intention to use mobile banking services.

3.4 Questionnaire Design and Construct Measurement

Structured questionnaire was developed to obtain the responses from consumers about their opinions or perception of mobile banking on various research variables.

The questionnaire of this study consists of eight variables: “perceived ease of use (6 items)”, “perceived usefulness (5 items)”, “perceived credibility (5 items)”, “subjective norms (6 items)”, “behavioral control (6 items)”, “perceived risk (5 items)”, “attitude to use (7 items)” and “intention to use (3 items)”.

All variables were originally adopted from prior research, and are well founded in the adoption literature review, whereas some appropriate revisions were applied to make the measurement to fit the research context for adaptation to the mobile commerce services.

3.4.1 Perceived Ease of Use

To measure consumers’ perceptions of ease of use, this study adapted a total of 6 questionnaire items which was developed by the study done by Bhattacherjee (2001), Davis et al. (1989), Taylor& Todd (1995) and Venkatesh & Davis (2000). Seven-point Likert scales are employed to evaluate perceived ease of use. Respondents are asked to indicate their level of agreement toward each statement, from strongly disagree (=1) to strongly agree (=7). The questionnaire items for perceived ease of use are listed in Table 3.1.

3.4.2 Perceived Usefulness

To measure consumers' perceived usefulness of mobile banking website, this study adapted 5 questionnaire items based on the work of Davis et al. (1989), Nysveen et al. (2005) and Luarn et al. (2005). All items are measured by seven-point Likert scales ranging from strongly disagree (=1) to strongly agree (=7). The perceived usefulness's questionnaire items are exhibited in Table 3.1.

3.4.3 Perceived Credibility

Perceived credibility is operationalized into 5 questionnaire items which was adapted from Luarn et al. (2005) study. Respondents are asked to indicate their level of agreeableness on their perceived credibility towards mobile banking. These measurement items are measured in seven-point Likert scales ranging from strongly disagree (=1) to strongly agree (=7) and are listed in Table 3.1.

3.4.4 Subjective Norms

Subjective norms questionnaire items were adapted from Nysveen et al (2005), Teo & Pok (2003), Taylor & Todd (1995), Seok-Jae, Ok (2006) and it consists of 6 items which are used to measure consumers' subjective norms towards mobile banking. Seven-point Likert scales, rating from strongly disagree (=1) to strongly agree (=7) are used to measure these 6 items. The questionnaire items for subjective norms are presented in Table 3.1.

3.4.5 Behavioral Control

To measure consumers' behavioral control towards mobile banking, this study adapted past study from Nysveen et al (2005), Teo & Pok (2003), Taylor & Todd (1995), Seok-Jae, Ok (2006) which consists of 6 items measurement. Respondents are asked to indicate their level of agreement using seven-point Likert scales which range from strongly disagree (=1) to strongly agree (=7). List of the questionnaire items are listed in Table 3.1.

3.4.6 Perceived Risk

In this section, a total of 5 items were adapted to measure perceived risk toward mobile banking, based upon the research of Bhimani (1996), Cockburn & Wilson (1996) and Chan & Lu (2004). These 5 items are measured using seven-point Likert scales ranging from strongly disagree (=1) to strongly agree (=7). The questionnaire items are depicted in Table 3.1.

3.4.7 Attitude toward Use

There are a total of 7 items were adapted to measure attitude toward use of mobile banking, based upon the research of Teo & Pok (2003), Taylor & Todd (1995), Seok-Jae, Ok (2006). These 7 items are measured using seven-point Likert scales ranging from strongly disagree (=1) to strongly agree (=7). The questionnaire items are depicted in Table 3.1.

3.4.8 Behavioral Intention to Use

In this section, a total of 3 items were adapted to measure behavioral intention to use mobile banking, based upon the research of Seok-Jae, Ok (2006), Nysveen et al (2005). These 5 items are measured using seven-point Likert scales ranging from strongly disagree (=1) to strongly agree (=7). The questionnaire items are depicted in Table 3.1.

3.4.9 Information of Respondents

In order to obtain experienced internet banking respondents to evaluate the questionnaire items rather than based on perception evaluation instead are captured in this section. The different demographic of the respondents are also captured in this study. The questionnaire items pertaining to respondents are contained in the last section of the questionnaire and are categorized into the following:

1. Gender of the respondent
2. Age range of the respondent
3. Race of the respondent
4. Current occupation of the respondent
5. Education level of the respondent
6. Income level of the respondent
7. Marital status of the respondent

Refer to Table 3.1 for a summary of the instrument gathered information about the research constructs, namely perceived usefulness, perceived ease of use, perceived credibility, subjective norms, perceived behavioral control, perceived risk, attitude toward use and intention to use.

Table 3.1: *Measurements of Research Variables*

Variable	Measurement Items	Literature Based
Perceived Ease of Use	1. Mobile banking is easy to use 2. Learning to operate mobile banking is easy for me 3. It would be easy for me to become skillful at using mobile banking 4. It is easy to make the mobile banking services do what I want it to 5. The interaction with mobile banking services are clear and understandable 6. It is easy to interact with mobile banking services	Bhattacherjee (2001), Davis et al. (1989), Taylor & Todd (1995), Venkatesh & Davis (2000)
Perceived Usefulness	1. Using the mobile banking is a time-saving way 2. Using the mobile banking is an efficient way 3. Using mobile banking would improve my performance in conducting banking transaction 4. Using mobile banking would make it easier for me to conduct banking transaction 5. I would find mobile banking useful in conducting my banking transaction	Davis et al. (1989), Nysveen et al. (2005), Luarn et al. (2005)
Perceived Credibility	1. Using mobile banking would not divulge my personal information 2. I would find mobile banking secure in conducting my banking transactions 3. Using mobile banking facilities is financially secure 4. I trust the security measure of mobile banking technology 5. I trust the ability of mobile banking system to protect my privacy	Luarn et al. (2005)
Subjective Norms	1. People who influence my behavior would think I should use mobile banking 2. It is expected that people like me use the mobile banking 3. People I look up to expect me to use mobile banking 4. People who are important to me think I should use mobile banking 5. People who are important to me would find using mobile banking a good idea 6. People who are important to me would find using mobile banking beneficial	Nysveen et al (2005), Teo & Pok (2003), Taylor & Todd (1995), Seok-Jae, Ok (2006)

(continued)

Table 3.1 continued

Variable	Measurement Items	Literature Based
Behavioral Control	1. Using the mobile banking is entirely within my control 2. I would be able to use mobile banking 3. I have the ability to use mobile banking 4. I have the knowledge to use mobile banking 5. I feel free to use the kind of mobile banking services I like to 6. I have the necessary means and resources to use the mobile banking	Nysveen et al (2005), Teo & Pok (2003), Taylor & Todd (1995), Seok-Jae, Ok (2006)
Perceived Risk	1. Advances in mobile security technology provide for safer mobile banking transactions 2. It is very easy for my money to be stolen if using mobile banking 3. I am not confident over the security aspect of mobile banking 4. Others will know information concerning my mobile banking transaction 5. Others can tamper with information concerning my mobile banking transaction	Bhimani (1996), Cockburn & Wilson (1996) and Chan & Lu (2004)
Attitude toward Use	1. Using mobile banking is a good idea 2. Using mobile banking is a wise idea 3. I think that using mobile banking is beneficial to me 4. I like the idea of using mobile banking 5. Using the mobile banking would be pleasant 6. I have positive perception about using mobile banking 7. My attitude toward mobile banking is favorable	Teo & Pok (2003), Taylor & Todd (1995), Seok-Jae, Ok (2006)
Behavioral Intention to Use	1. I intend to use mobile banking continuously in the future 2. I will strongly recommend others to use mobile banking 3. I will frequently use mobile banking in the future	Seok-Jae, Ok (2006), Nysveen et al (2005)

The detailed contents of the final form including the statement of the questionnaire items and the ranging or the scale are shown in Appendix B.

3.5 Sampling

The sampling procedure that was adopted in this study for data collection was convenience sampling method through questionnaire survey with a pre-planned sample size of 350 respondents. The questionnaire survey was distributed in Klang Valley, which is the most populous, urbanized and industrialized region in Malaysia with total population of 6.7 million in 2005 and expecting to reach 8.5 million by 2020 (Dali, 2008). Generally, the respondents have been exposed to multiple forms of banking methods available in Malaysia.

Overall, from the total of 350 questionnaires distributed during a one month data collection period, there were only 311 valid questionnaires responses that can be used for further analysis. This represents a response rate of 88.85%, in which it is still adequate to arrive at the desired and expected achievement of this study as compare to other similar past studies that involved sample size of 262 (Mathieson, 1991), 394 (Luarn and Lin, 2005), 910 (J.-C. Gu, 2009). Further discussion about the descriptive analysis of the samples characteristics were given in the next chapter.

3.6 Data Analysis Procedures

In order to achieve the purposes of this study and test the hypotheses, Statistical Package for Social Science (SPSS) 17.0 was used to analyze the collected data. The current research conducted the following data analysis.

3.6.1 Pre-Analysis Data Screening

Preliminary analyses were performed to ensure there is no violation of the assumptions of normality and regression test. Normality test was performed to determine whether the variables are normally distributed, to remove extreme outliers and also to determine whether parametric or non-parametric test can be used in this study. Such normality test includes Skewness and Kurtosis, Histogram and Box-Plot analysis.

Besides that, regression assumption test was performed to ensure the data fit for regression analysis without any violation of the assumptions. Those assumptions include the following:

1. Ratio of cases to independent variables – the number of cases needed for regression model should have 20 times more cases than the predictors.
2. Normality, linearity and homoscedasticity – these assumptions assume that the differences between the obtained and predicted dependent variables scores are normally distributed and the residuals (independent variables) have a linear relationship with the predicted dependent variable scores.
3. Multicollinearity and auto-correlation – the assumptions here are the IVs must not be significantly correlated to avoid multicollinearity and there is no auto-correlation whereby the observations or values is independent (there are no systematic trend in the errors of the observation of the values). Multicollinearity can be confirmed via Tolerance and Variance Inflation Factor (VIF) while auto-correlation is detected via Durbin-Watson statistic.

3.6.2 Descriptive Statistic Analysis

To better understand the characteristics of the sample, descriptive statistics analysis was used to illustrate the respondents' characteristics and means and standard deviation of each variable.

3.6.3 Reliability and Validity Test

Reliability and validity are of vital importance in the measurement scales. Reliability analysis is a measure of the internal consistency of indicators for a construct (Hair et. al, 1998). The purpose of reliability analysis is to determine how well a set of items taps into some common sources of variance (Viswanathan, 2005), and is frequently measured with Cronbach's coefficient alpha. Cronbach's coefficient alpha is "the ratio of the sum of the covariances among the components of the linear combination (items), which estimates true variance, to the sum of all elements in the variance-covariance matrix of measures, which equals the observed variance" (Nunnally and Bernstein, 1994, p. 212).

Validity is the extent to which a scale or set of measures accurately represents the concept of interest. Content validity (Devellis, 2003, p. 49) was established during preparation of the questionnaire by using scales already validated in the literature, carefully analyzing the items. All the traditional measures are based upon previously validated measures (Venkatesh and Morris, 2000), and their reliabilities were considered acceptable.

Then, construct validity test was performed which consists of discriminant validity and convergent validity. Discriminant validity reflects the degree to which two

conceptually similar constructs are distinct, and the correlation here should be low. Correlation analysis can be used to assess this type of validity. If the correlation result indicated that the correlation between variables were not higher than 0.8 (Bagozzi, 1994), this would conclude that the different constructs are not measuring the same thing.

Convergent validity refers to the degree to which the measures of the same construct are correlated, and the correlation here should be high. It can be assessed via confirmatory factor analysis (CFA) which is a common accepted method for this test (Netemeyer et al., 2002). CFA allows the researcher to verify the factor structure of a set of observed variables based on the existing knowledge of the theory, empirical research, or both. If the measurement items of each construct have individual factor loadings at least 0.50 and all measurement items are significant (level of .01) for Bartlett's test of sphericity (Sanzo et al., 2003) and index for Kaiser-Meyer-Olkin (KMO) is at least 0.6 (Pallant, 2001), the scale is concluded has convergent validity.

3.6.4 Multiple Regression Analysis

Multiple regression is used to account for (predict) the variance in an interval dependent, based on linear combinations of interval, dichotomous, or dummy independent variables (Garson, 2005). Multiple regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (significance test of R square), and can establish the relative predictive importance of the independent variables (comparing beta weights) (Garson, 2005).

Multiple regression analysis is also used to test the proposed hypotheses on the constructs of perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude and behavioral intention to use mobile banking services. The regression analysis will determine which factors have positive influence to the behavioral intention and which factor is the best predictor of behavioral intention towards using mobile banking services in Malaysia.

CHAPTER 4: RESEARCH FINDINGS

This chapter shows the pre-analysis and descriptive results of data collection and presents the findings of data analysis associated with the research hypotheses. There are four sections in this chapter. The first section includes the summary of the pre-analysis data screening result before further data analysis can be conducted. This section will present the normality and regression assumption test result. The second section consists of the reliability test result of each variable in the study and validity test result which covers the aspect of content validity and construct validity (discriminant and convergent validity). In third section, the descriptive results of the sample profiles and research variables are presented. Lastly, the forth section is the multiple regression results that describe the data analysis associated with the research hypotheses and validation of the research framework as a whole.

4.1 Pre-Analysis Data Screening

Data screening using box-plot method is performed to identify if outliers exist. Before that, tested variables (perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude and behavioral intention) which are in ordinal type (7-point Likert scale) are converted into interval data. From the box-plot analysis, outliers identified from the cases were removed. In addition, normality tests which include skewness, kurtosis, and histogram and box plot are conducted to ensure all the tested variables meet the normal distribution's criteria. The skewness and kurtosis test shows that the value of the tested variables is between -2 and +2 where the variables (perceived ease of use,

perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude and behavioral intention) are mostly negatively skewed while box-plots analysis shows that there are no outliers for all the variables. All these tests revealed that the variables are normally distributed. Consequently, as the variables are in interval type and each of them proven was normally distributed, parametric test is used for further data analysis. The normality test results are provided in the Appendix A.

Apart from that, regression assumption test was performed to ensure assumption 1 to 3 presented in Section 3.6.1 are not violated (assumption 1: ratio of cases to IVs; assumption 2: normality, linearity and homoscedasticity; assumption 3: multicollinearity and auto-correlation). From the test, the result shows that assumption 1 is not violated as there are 311 cases used in this study in which it has met the minimum 140 cases needed for the seven predictors (number of cases = 20 times more than the predictors). For assumption 2, the residual scatterplot shows the scores are evenly distributed and the residual normal plot shows the scores distributed along the regression line. This indicated assumption 2 is not violated whereby that the differences between the obtained and predicted variables scores are normally distributed and the residuals have a linear relationship with the predicted dependent variables scores. Thus, normality, linearity and homoscedasticity are ensured.

Multicollinearity occurs when a single independent variable is highly correlated with the set of other independent variables (Hair et. al, 1998: p.143). It represents the degree to which one variable can be predicted by the other variables in the analysis. High multicollinearity contributes negatively to the interpretation of the result as it

makes it difficult to ascertain the effects of a single variable. Hair et. al (1998) suggests that calculating tolerance and VIF values are good measures for testing multicollinearity. According to Tolerance and VIF test, multicollinearity does not exist if the Tolerance level is more than .1 and VIF is less than 10 (Ho, 2006). All the independent variables are not significantly related as the collinearity statistics shows Tolerance level is more than .1 and the VIF level is less than 10. This indicates that the data do not suffer any collinearity problems. Table 4.1 below shows the values of multicollinearity test result.

Table 4.1: *Tolerance and VIF Test for Multicollinearity*

Variable	Collinearity Statistics	
	Tolerance	VIF
Perceived Ease of Use	.312	3.208
Perceived Usefulness	.779	1.283
Perceived Credibility	.616	1.623
Subjective Norms	.688	1.453
Behavioral Control	.973	1.028
Perceived Risk	.862	1.160
Attitude	.304	3.294

The value of Durbin-Watson is 1.416. The acceptable range Durbin-Watson statistic recommended by Field (2009) is between 1.0 and 3.0 and multicollinearity VIF is less than 4.0. This shows that there was no auto correlation problems in the data used in this research. As a result, assumption 3 is not violated where multicollinearity and autocorrelation do not exist.

In conclusion, all the variables are normally distributed and the assumptions of multiple regression analysis are not violated, thus the data used in this study is fit for further statistical analysis.

4.2 Reliability and Validity Test

To ensure data validity and reliability, this study first pre-tested the questionnaire by having the research supervisor to review it.

The internal reliability of the items was verified by computing the Cronbach's alpha (Nunnally, 1978). In the Cronbach's alpha analysis, a scale is considered to be reliable when it gives values equal to or greater than 0.6 (Fornell and Larcker, 1981; Bagozzi and Yi, 1988; Hair et al., 1998). Nunnally (1978) indicates strong reliability if the alpha co-efficient exceeds 0.7 and moderate reliability if the alpha co-efficient exceeds 0.6. The Cronbach's alpha coefficients range from 0.602 to 0.944 that satisfactorily meet the minimum acceptable level of Cronbach's alpha coefficient that is 0.60. Therefore, these have suggested that items involved adequately measure a single construct for each tested variables (perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude and behavioral intention). Reliability measurement for each construct is shown in Table 4.2.

Table 4.2: *Reliability Measurement for Research Variables*

Variable	Number of items (N)	Cronbach's Alpha
Perceived Ease of Use	6	.853
Perceived Usefulness	5	.949
Perceived Credibility	5	.602
Subjective Norms	6	.773
Behavioral Control	6	.873
Perceived Risk	5	.828
Attitude	7	.852
Behavioral Intention	3	.944

Regarding validity, previously validated measurements from the past literatures are used to ensure the validity of the measurements. Thus, content validity is achieved.

For construct validity in term of discriminant validity test, correlation analysis between the variables is performed. The result shows the correlations are low, in which the values are not higher than 0.8 as proposed by Bagozzi (1994). This indicates that the constructs are distinct from one another and deemed as an acceptable level of discrimination. Refer Table 4.3 for the correlation analysis between the variables.

Table 4.3: *Pearson's Correlation Coefficient between the Research Variables*

Variables	PEOU	PU	PC	SN	BC	PR	ATU	BITU
PEOU	1	.134	-.596	.403	.069	.217	.788	.434
PU	.134	1	-.135	.339	.035	.089	.338	.619
PC	-.596	-.135	1	-.307	.074	-.208	-.555	-.244
SN	.403	.339	-.307	1	.027	.338	.430	.341
BC	.069	.035	-.074	.027	1	.021	-.016	.088
PR	.217	.089	-.208	.338	.021	1	.144	.046
ATU	.788	.338	-.555	.430	-.016	.144	1	.590
BITU	.434	.619	-.244	.341	.088	.046	.590	1

PEOU – Perceived ease of use
PU – Perceived usefulness
PC – Perceived credibility
SN – Subjective norms
BC – Behavioral control
PR – Perceived risk
ATU – Attitude to use
BITU – Behavioral intention to use

Likewise, the construct validity of these concepts is considered acceptable. In previous similar studies, constructs shared by different investigated models were measured using the same items.

To summarize, the measurement scales used in this study are generally reliable and valid, which permitted to draw further argument and discussion on assessing the relationship between the independent variables (perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude) and dependent variable (behavioral intention).

4.3 Descriptive Statistics

4.3.1 Characteristics of Respondents

Table 4.4 presents descriptive profiles of the sample (n=311), including two major items in this study:

(1) Demographic profiles: gender, age group, race, education level, income level, marital status, and

(2) Mobile banking preference profiles: mobile banking user, level of interest to use mobile banking, banking method preference.

It is shown that female respondents (50.5%) are slightly higher than male (49.5%). Majority respondents belong to age group between 21 years old to 30 years old (58.2%) and are from Chinese ethnic (63.0%). Respondents who possess a bachelor degree or professional certificate are in the majority (68.2%). Furthermore, 41.5% of the respondents are from income group between RM3,001 to RM5,000 and more than 40.8% of the respondents are from the clerical or supporting staff.

In addition, majority of the respondents (86.2%) is not a mobile banking user at the moment. 43.1 % of the respondents are showing interested to use mobile banking with 2.3% of very interested and 40.8% are interested to use the mobile banking services. Most of the respondents with 57.9% prefer to use internet as compare to other banking methods. Only 2.6% of the respondents are taking mobile banking as their first choices as the banking method.

Table 4.4: *Profiles of the Sample*

Classification	Frequency	Percentage (%)
Demographic Profile		
Gender		
Male	154	49.5
Female	157	50.5
Age Group		
21-30	181	58.2
31-40	107	34.4
41-50	16	5.1
51 & above	7	2.3
Race		
Malay	63	20.3
Chinese	196	63.0
Indian	45	14.5
Others	7	2.2
Occupation		
Unemployed	7	2.3
Middle Management	71	22.8
Supervisor	88	28.3
Clerical/Supporting Staff	127	40.8
Own Business	18	5.8
Education Level		
SPM/MCE	4	1.3
STPM/HSC	6	1.9
Certificate/Diploma	32	10.3
Degree/Professional Certificate	212	68.2
Postgraduate	57	18.3
Income Level		
<= RM1,500	29	9.3
RM1,501 – RM3,000	30	9.6
RM3,001 – RM5,000	129	41.5
RM5,001 – RM7,000	101	32.5
RM7,001 – RM9,000	15	4.8
>= RM9,001	7	2.3
Marital Status		
Single	154	49.5
Married	157	50.5

(continued)

Table 4.4 continued

Classification	Frequency	Percentage (%)
Usage Profiles		
Recent mobile banking user	43	13.8
Level of interest to use mobile banking		
Very Interested	7	2.3
Interested	127	40.8
Neither	46	14.8
Less Interested	92	29.6
Not Interest At All	39	12.5
First preference of banking method Internet Banking	180	57.9
Conventional Banking	65	20.9
Mobile Banking	8	2.6
ATM	47	15.1
Phone Banking	11	3.5

* Note: The sample size (n) is 311.

4.3.2 Descriptive Analysis of Research Variables

Table 4.5 shows some descriptive for the research variables used in this study. The table shows minimum, maximum, mean, standard deviation, skewness and kurtosis for each of the research variables (perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk, attitude and behavioral intention). In terms of research variables, there are 6 items of perceived ease of use, 5 items of perceived usefulness, 5 items of perceived credibility, 6 items of subjective norms, 6 items of behavioral control, 5 items of perceived risk, 7 items of attitude and 3 items of behavioral intention. The result shown below is the summation of all the items belong to each variable from the seven-point Likert scales. The mean scores of perceived ease of use is on average 5.27 (=31.63/6) in a seven-point Likert type scale in which it shows that the respondents have slight degree of positive evaluations on the perceived ease of use of mobile

banking. While for perceived usefulness variable, the means score is 4.11 (=20.56/5). This score fall to the seven-point Likert scale between "neither" and "slightly agree" scale.

Table 4.5: *Descriptive Statistic of Research Variables*

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
PEOU	311	22.00	41.00	31.6302	3.95641	-.258	-.355
PU	309	5.00	32.00	20.5631	6.47573	-.190	-.730
PC	311	9.00	21.00	14.5145	2.83508	.188	-.704
SN	310	18.00	40.00	30.3548	4.95774	-.082	-.597
BC	311	11.00	39.00	22.7106	6.75277	.248	-.650
PR	311	9.00	32.00	19.6270	5.40989	-.160	-.767
ATU	311	27.00	48.00	37.8232	4.52779	-.050	-.628
BITU	311	7.00	21.00	15.0000	3.60197	-.271	-.609
Valid N (listwise)	306						

PEOU – Perceived ease of use
PU – Perceived usefulness
PC – Perceived credibility
SN – Subjective norms
BC – Behavioral control
PR – Perceived risk
ATU – Attitude to use
BITU – Behavioral intention to use

Besides that, the average means score in a seven-point Likert scale for perceived credibility is 2.90 (=14.51/5), for subjective norms is 5.06 (=30.35/6), for behavioral control is 3.79 (=22.71/6), for perceived risk is 3.92 (=19.63/5) and for attitude is 5.40 (=37.82/7). Lastly, for behavioral intention variable, the means score is 5.00 (=15.00/3). This score fall to the seven-point Likert type scale in which it shows that the respondents have slightly degree on behavioral intention towards mobile banking. Thus, the result suggests that the respondents tend to slightly agree to use mobile banking service.

The measures of symmetry of distribution (Skewness and Kurtosis) show that all the variables fall inside the range of -1 to +1. This, according to Hair et al. (1998) indicates the variables distributions are normally distributed and parametric analysis is being carried out.

4.4 Multiple Regression Analysis

Multiple regression analysis is conducted in order to examine the factors influencing the adoption of mobile banking services in Malaysia. The analysis is carried out to test the effect of perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk and attitude with behavioral intention to use mobile banking services. Multiple regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (significance test of R square), and can establish the relative predictive importance of the independent variables (comparing beta weights) (Garson, 2005). This will include testing of hypothesis 1-7.

Table 4.6 and Table 4.7 show that the regression is significant ($F_{(7, 311)} = 55.89$, $p < .01$). There is a correlation between 7 IVs (attitude to use, perceived risk, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived ease of use) with DV, behavioral intention to use (R = .75). Attitude to use, perceived risk, perceived usefulness, perceived credibility, subjective norms, behavioral control, and perceived ease of use explain 57% of the variance of behavioral intention to use ($R^2 = .57$) and 55.6% of the variance of behavioral intention to use in real population (Adjusted $R^2 = .556$).

Table 4.6: *Multiple Regressions of IVs on DV (Behavioral Intention)*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.752[a]	.566	.556	2.40701	.566	55.868	7	300	.000

a. Predictors: (Constant), attitude to use, perceived risk, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived ease of use

b. Dependent Variable: Behavioral intention to use

Table 4.7: *Significant of IVs on DV (Behavioral Intention)*

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2265.779	7	323.683	55.868	.000[a]
	Residual	1738.105	300	5.794		
	Total	4003.883	307			

a. Predictors: (Constant), attitude to use, perceived risk, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived ease of use

b. Dependent Variable: Behavioral intention to use

Table 4.8 shows that perceived ease of use, perceived usefulness, perceived credibility, behavioral control and attitude to use correlate positively and are significant with behavioral intention to use but not for subjective norms and perceived risk. Perceived ease of use was found as a significant, positive predictor on behavioral intention to use ($\beta = .137$, $p < .05$). Perceived usefulness ($\beta = .485$, $p < .01$), perceived credibility ($\beta = .113$, $p < .05$), behavioral control ($\beta = .077$, $p < .05$) and attitude to use ($\beta = .385$, $p < .01$) also is a significant, positive predictor on behavioral intention to use. However, subjective norms ($\beta = .012$, $p > .05$) and perceived risk ($\beta = -.061$, $p > .05$) was found not significantly predicting behavioral intention to use.

Table 4.8: *Coefficients and Significant of Each IV on DV (Behavioral Intention)*

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-8.536	2.296		-3.718	.000		
	PEOU	.124	.062	.137	2.005	.046	.312	3.208
	PU	.270	.024	.485	11.253	.000	.779	1.283
	PC	.143	.062	.113	2.325	.021	.616	1.623
	SN	.009	.033	.012	.267	.789	.688	1.453
	BC	.041	.021	.077	1.999	.047	.973	1.028
	PR	-.039	.027	-.061	-1.499	.135	.862	1.160
	ATU	.306	.055	.385	5.573	.000	.304	3.294

a. Dependent Variable: Behavioral intention to use

PEOU – *Perceived ease of use*
PU – *Perceived usefulness*
PC – *Perceived credibility*
SN – *Subjective norms*
BC – *Behavioral control*
PR – *Perceived risk*
ATU – *Attitude to use*

Meanwhile, findings show that perceived usefulness coefficients (β = .485) is the highest, follow by attitude to use (β = .385), perceived ease of use (β = .137), perceived credibility (β = .113) and behavioral control (β = .077). This indicates that perceived usefulness is more predictive of behavioral intention to use than attitude to use, perceived ease of use, behavioral control and perceived credibility.

Based on the findings, perceived ease of use and perceived usefulness were found to have positive influence on the behavioral intention towards mobile banking services. The positive influence of perceived ease of use, perceived usefulness and behavioral intention to use suggested by TAM is confirmed by the findings. This suggests that the ease of use of the technology and the degree in which the consumer is satisfied with the online services experience are imperative in predicting the potential consumer intent.

Thus, **H1 and H2** are supported in this study. Beta value of .137 indicates that 1 unit increase in perceived ease of use variable will result .137 increases in behavioral intention to use variable. Perceived usefulness with beta value .485 also indicates that 1 unit increase in perceived usefulness variable will result .485 increases in behavioral intention to use variable.

Perceived ease of use, has a direct, positive effect on intention to use information technology (Davis et al., 1989; Gefen & Straub, 2000; Karahanna et al., 1999). Another point related to control is worthy of note-in IS research, perceived ease of use has been seen to be a determinant of attitude consistent with TPB (Davis et al. 1989, Taylor and Todd 1995). This suggests that if customers perceive the mobile banking is easy to use, they might adopt that system or use it in preference to other systems which are perceived as hard to use.

The positive effect of perceived usefulness on behavioral intentions to use the retailer has been supported by scholars (Gefen & Straub, 1997; Koufaris, 2002; Lin & Lu, 2000). Their study supported prior research findings in that they found that there was a significant effect of perceived usefulness on intention in the online distribution context. This suggests that if customers perceive mobile banking to be a useful, quicker and easier way of carrying out financial transactions, they will adopt or use the services.

Meanwhile, perceived credibility, behavioral control and attitude to use also have a significant, positive influence on behavioral intention to use. Thus, **H3, H5 and H7** are supported in this study. Beta value of .113 indicates that 1 unit increase in

perceived credibility variable will result .113 increases in behavioral intention to use variable. Behavioral control with beta value .077 also indicates that 1 unit increase in behavioral control variable will result .077 increases in behavioral intention to use variable. Attitude to use with beta value .385 also indicates that 1 unit increase in attitude to use variable will result .385 increases in behavioral intention to use variable.

This study also supports the valid argument on perceived credibility as previously examined by Luarn and Lin (2005) and Wang *et al*. (2003). They found that the intention to use mobile banking was influenced by the extent of security and privacy associated within the context of mobile banking. The results correspond to the prior research that perceived behavioral control has been found to significantly influence behavioral intention to adopt mobile commerce. The existence of a strong relationship between intention and behavior has been documented (Ajzen & Fishbein, 1974; Fishbein & Ajzen, 1975). Behavioral control has been shown to have an effect on key dependent variables such as intention and behavior in a variety of domains (Ajzen 1991). Elasmar & Cartar, (1996), suggested that knowledge gained from past behavior would help to shape intention.

Based on the findings, subjective norms and perceived risk do not significantly influence on behavioral intention towards using mobile banking. Therefore **H4** and **H6** are rejected in this study. The results indicate that subjective norms and perceived risk is not a predictor of behavioral intention towards using mobile banking services in Malaysia. The lack of significant subjective norms-behavioral intention effect is also found in prior research. This is in accord with the results of Mathieson (1991)

that found subjective norm has no significant effect on intention. According to Mathieson (1991), Liao et al. (1999) and Shih & Fang (2004), behavioral intention was not predicted by subjective norms.

Consequently, hypothesis H6 that, perceived risk has a direct negative effect on intention to use mobile banking services, was not supported (β= -0.061, p=0.135). Lee et. al (2007) revealed that reported perceived risk had an insignificant direct relationship with adoption behavior on mobile banking services. This insignificant was found to support the study. In addition, this is also in consistent with the findings from Podder (2005) that found similar results suggesting an insignificant relationship between perceived risk and intention to use on mobile banking.

Perceived risk has been shown to negatively influence transaction intentions with Web retailers (Jarvenpaa et. al, 1999; Pavlou, 2001; Pavlou et. al, 2002). The perceived risk associated with online transactions may reduce perceptions of behavioral and environmental control. This lack of control is likely to negatively influence transaction intentions. Besides, banking consumers are likely to transact online if their risk perceptions about behavioral and environmental uncertainties are alleviated, so that they gain control over their online transactions. Further, in chapter 2, perceived risk has been found major impediments to adoptions in many countries across the world (Podder , 2005).

Additionally, perceived usefulness have a **highly significant, positive influence** on behavioral intention towards using mobile banking services among independent variables of perceived ease of use, perceived usefulness, perceived credibility,

behavioral control and attitude to use. Then, it is followed by attitude to use, perceived ease of use, behavioral control and perceived credibility accordingly.

Although attitude to use, behavioral control, perceived ease of use and perceived credibility are still necessary for behavioral intention to use mobile banking, the results have shown that perceived usefulness has becoming an essential factor to ensure behavioral intention towards using mobile banking in Malaysia.

In conclusion, the Table 4.9 shows the summary of the research findings.

Table 4.9: *Summary of research findings*

Hypothesis	**Beta Value**	**Finding**
H1: Perceived Ease of Use – Behavioral Intention	0.137**	Supported
H2: Perceived Usefulness – Behavioral Intention	0.485**	Supported
H3: Perceived Credibility – Behavioral Intention	0.113**	Supported
H4: Subjective Norm – Behavioral Intention	0.012	Not Supported
H5: Perceived Behavioral Control – Behavioral Intention	0.077**	Supported
H6: Perceived Risk – Behavioral Intention	-0.061	Not Supported
H7: Attitude – Behavioral Intention	0.385**	Supported

CHAPTER 5: CONCLUSION

This chapter addresses the summary results of this study as well as managerial implication in the first section. Limitations and recommendations of this study are subsequently presented.

5.1 Research Conclusions and Implications

The research questions for this study is to explore the influences of perceived ease of use, perceived usefulness, perceived credibility, subjective norms, perceived behavioral control, perceived risk and attitude towards use in the context of mobile banking applicable to Malaysia and to investigate which factors are essential to affect the behavioral intention towards using mobile banking services in Malaysia.

Based on the data analyses discussed in the preceding chapter, the results of the hypotheses testing are summarized in Table 5.1. The hypotheses define the links and influence between these variables. The analysis finds that hypothesis H1, H2, H3, H5 and H7 are supported. However, the remaining two hypotheses H4 and H6 are not supported in this study. It is also found that among the five independent variables, perceived usefulness is the best predictor of behavioral intention towards using mobile banking services.

The results of the model tested for this study show that perceived ease of use, perceived usefulness, perceived credibility, perceived behavioral control and attitude contribute significant results as hypothesized. Properties of the relationship among research constructs, including standardized path coefficients for each equation in the

hypothesized model, are presented in Figure 6.1. Hypothesis H1, H2, H3, H5 and H7 were supported in that perceived ease of use, perceived usefulness, perceived credibility, perceived behavioral control and attitude all had significant effect. Figure 6.1 illustrates that hypotheses H1, H2, H3, H5 and H7 were significantly supported. However, the remaining three hypotheses, including of H4 and H6 are not supported in this study.

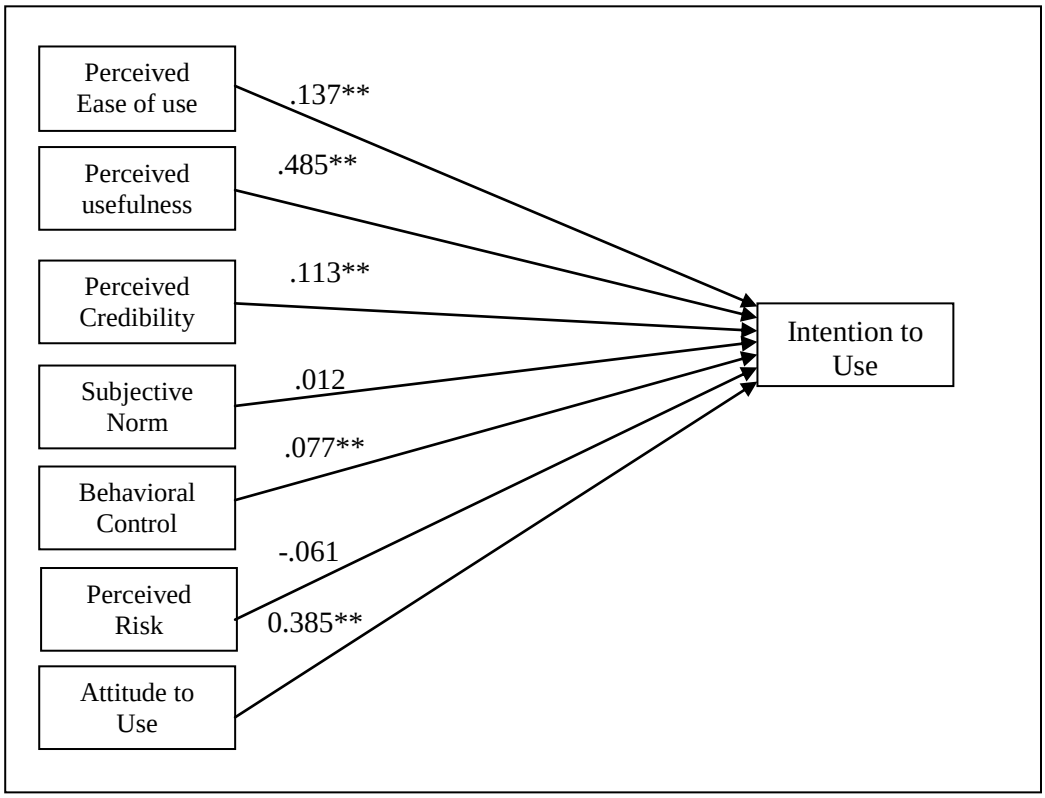

Figure 5.1: *The Results of Hypothesis Tests*

All these results lead to the achievement of the stated research questions and consequently reflect a number of conclusions and managerial implications drawn as follows.

Table 5.1: *Summary of Hypotheses Testing*

Hypothesis		Coefficient	Result	Supported Literatures
H1	Perceived ease of use has a positive effect on behavioral intention to use mobile banking services	.137	Supported	Davis et al. (1989); Gefen & Straub (2000); Karahanna et al. (1999)
H2	Perceived usefulness has a positive effect on behavioral intention to use mobile banking services	.485	Supported	Gefen & Straub (1997); Koufaris (2002); Lin & Lu (2000)
H3	Perceived credibility has a positive effect on behavioral intention to use mobile banking services	.113	Supported	Luarn & Lin (2005); Wang *et al*. (2003)
H4	Subjective norms have a positive effect on intention to use mobile banking services	.012	Not Supported	Mathieson (1991); Liao et al. (1999); Venkatesh & Morris (2000); Shin & Fang (2004)
H5	Behavioral control has a positive effect on intention to use mobile banking services	.077	Supported	Ajzen & Fishbein (1974); Mathieson (1991); Hartwick & Barki (1994); Taylor & Todd (1995);
H6	Perceived risk has a negative effect on intention to use mobile banking services	-.061	Not Supported	Lee et. al (2007); Podder (2005); Tang et. al (2004)
H7	Attitude has a positive effect on intention to use mobile banking services	.385	Supported	Davis (1989); Yang (2003); Taylor & Todd (1995); Mathieson (1991); Hung et. al (2003); Teo et. al (2003); Nysveen et. al. (2005)

The contribution of this study to IT/IS acceptance researches are fourfold. First, it successfully applied the TAM in a new IS context such as mobile banking, very different from the system examined in prior studies. Consistent with previous studies, perceived ease of use and perceived usefulness were found to be significant antecedents of the behavioral intention to use mobile banking. Second, this supports Luarn & Lin (2005) and Wang et al.'s (2003) research that found a significant direct relationship between perceived credibility and behavioral intention to use internet banking, and so extends its generalizability to mobile banking. Thirdly, perceived behavioral control was found to have a significant influence on behavioral intention towards using mobile banking services which correspond to the prior researches results by Ajzen & Fishbein (1974), Fishbein & Ajzen (1975) and Elasmar & Cartar (1996). Finally, the final hypothesis predicted a positive relationship between attitude toward use and intention to use mobile commerce services. Attitudes toward intention to use mobile services have been significant in all studies (Nysveen et. al, 2005; Lexhagen et. al, 2005; Hung et. al, 2003; Teo & Pok, 2003).

5.1.1 Subjective Norms on Intention

It is found that subjective norm is not a predictor on behavioral intention towards using mobile banking services in the study. This is not consistent with most of the prior studies as mentioned in Chapter 2. However, there are few literatures that support the negative findings which aligned with the results in this study as shown in Table 5.1. Neither, Davis et al. (1989) nor Mathieson (1991) found a significant relationship between subjective norm and behavioral intention.

Venkatesh and Morris (2000) suggest that the individual tends to comply with others' views and use the target system to attain a favorable reaction from important referents in the early stages of user experience where user interaction with the target system has been somewhat limited, even if an individual does not have a favorable reaction to the information system. However, individuals have a better assessment of the costs and benefits associated with using that technology as direct experience with technology increases over time. Individuals begin to internalize others' opinions especially if they are consistent with the results of their own direct experience as their original decision was based on others' opinions. Hence, the direct effect of subjective norm on behavioral intention is reduced (Oliver & Bearden, 1985; Warshaw, 1980). User judgments reflect specific criteria that result from the interaction with the new system and less from normative influence with increasing experience.

With increasing experience with the target system, Venkatesh & Morris (2000) suggest that the influence of people diminishes to non significance over time. Furthermore, Venkatesh & Morris (2000) argued that the effect of subjective norm diminished over time in an older worker group, and that there was no effect in a younger worker group. Subjective norms were excluded as the effect of them on intention is controversial in the context of technology acceptance. When a consumer uses an online store, cognitive sources (e.g., usefulness) of prior experiences overcome social normative considerations (Karahanna, Straub, & Chervany, 1999). Reinecke, Schmidt & Ajzen (1996) have shown that the direct effect of subjective norm on intention is strong in the early stages of new behavior and tends to wear off over time.

5.1.2 Perceived Risk on Intention

Hypothesis H6 (perceived risk have a negatively effect on intention to use mobile banking services) is not supported in the study. As presented in the findings, the most striking and remarkable finding was the insignificant of perceived risk on behavioral intention to use mobile banking services. In addition, a number of advantages in using mobile banking services such as convenience and time saving still entice consumers to make mobile transactions even though they perceive some risk.

Privacy and security problems are often ignored by online transaction site providers despite most consumers being concerned with the various risks, including transaction security, merchant information, products, online privacy, and personal data. Similarly, privacy and security problems are less than satisfactory and must be resolved for mobile banking to become an accepted banking practice. In terms of theoretical perspective, it seemed reasonable that a higher perceived risk in mobile banking will lead to a lower rate of behavioral intention to use, which will result in lower mobile banking usage. Furthermore, perceived risk was expected to negatively influence consumer's behavioral intent, and believed to be a barrier and determinant to online transactions. However, a positive correction has been revealed from the data finding and data analysis of this study. This is consistent with the research by that Lee et. al (2007) that reported perceived risk had an insignificant direct relationship with adoption behavior on mobile banking services.

With respect to perceived risk, most of the respondents' previous online transaction experiences are exposed to the Internet. The banking consumers may avoid high risk associated with some mobile banking services although they decide to make online

transactions. This reveals that they are aware of the existence of potential risk because they have a better understanding of the mobile banking context as they use online system frequently. Therefore, it is suggested that mobile banking providers must provide a detailed explanation to customers about payment methods, returns or exchanges, transaction tracking and product delivery to fulfill customer expectations and relieve their anxieties (Wu & Wang, 2004). As a result, this will build the positive reputation to the mobile banking provider.

5.2 Research Limitations and Recommendations

Despite accomplishment in recognizing the relationship between perceived ease of use, perceived usefulness, perceived credibility, subjective norms, behavioral control, perceived risk and attitude with behavioral intention towards using mobile banking services in which the findings are useful for further validation, this study is subject to some limitations.

Major limitation is that the results presented in this study are based on the analysis using cross-sectional data due to the constraints on time and cost. As a result, strong evidence of the effects between research variables in the research model cannot be examined as a whole. Therefore, longitudinal study approach is suggested for future research projects.

Secondly, the sample was not representative from the actual population of Malaysia. The study is only limited to Klang Valley and utilized a convenience sampling method where the sample consists mainly postgraduate students and white-collar workers. Thus, the study sample may limit the generalizability of results. As the result

shows that hypothesis four and six is rejected, further studies are necessary to confirm the relationships between constructs by using a broader sample that represent Malaysia in order to increase generalizability of the research findings.

In addition, because mobile services are very broad and extensive, this study will only focus on examining the intention to use of mobile banking services. The relationship between intention and actual behavior was not being measured. However, this is not a serious problem because TRA and TPB both predict behavior from intention (Sheppard et. al, 1988). There is considerable evidence that intention to perform a behavior predicts actual behavior. Sheppard et. al, (1988) stated that there would be a significant and substantial relationship between individuals' intentions and behavior. Therefore, actual behavior is not tested in this study. Additionally, there is substantial empirical support for the intention-behavior link. Ajzen et. al. (1986) found both TRA and TPB assert that actual behavior is a direct function of behavioral intention. An objective for future research would be to identify the relationship under which actual behavior is important.

The investigation of mobile banking acceptance in this study suggests seven constructs only to gauge customers' intention to use the relatively new mode of financial transactions. However, these constructs can be integrated with others to provide a more comprehensive understanding of mobile banking acceptance. Therefore, there is a need to explore additional independent variables that can predict usage intention more accurately. For a suggestion, new measures such as perceived financial costs and prior computing experience can be applied in the model for future research.

There are, of course, many others variables that could have included in this analysis and which can be considered relevant to predicting the actual and future use of mobile services more accurately. This can be an interesting challenge for the future researchers and offers them new and exciting research opportunities to work on in the times to come. These limitations may provide a meaningful research area for the future.