Factors Affecting Malaysian Mobile Banking Adoption: An Empirical Analysis

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Abstract

This empirical study aims to investigate the factors that influence Malaysians’ intention to adopt mobile banking by extending the renowned framework of Technology Acceptance Model (TAM). A self-administered questionnaire had been developed and distributed in Malaysia. Out of the 400 questionnaires, only 175 usable questionnaires were returned, yielding a response rate of 43.75 percent. Results were subsequently analyzed by using multiple regression and factor analysis. Factors such as perceived usefulness (PU), perceived ease of use (PEOU), relative advantages (RA) and personal innovativeness (PI) were found positively related with the intention to adopt mobile banking services. However, social norms (SN) were the only factor found insignificant. As expected, perceived risks (PR) was negatively associated with the mobile banking adoption. The research findings provide several important implications for banks, service developers, and software engineer with better strategic insights to design and implement mobile banking services to yield higher consumer acceptance towards mobile banking in Malaysia.

Key words: Mobile Banking, Technology Acceptance Model (TAM), Malaysia
1 Introduction

Gone were the days, where the demand of internet connectivity only relies on desktop. The advancement of mobile technologies [18] have successfully embraced the wireless connectivity technology [68]. The increasing use of smartphones (e.g. iPhone and Blackberry) has effectively leveraged mobile banking activities [24]. In fact, the paradigm shift has altered consumers’ behavioural patterns in interacting with financial institutions [51], [52] and eventually changing the rules of buying and selling [77]. Hence, banks have laid its emphasis on the implementation on mobile banking services because it shed the light on reduce costs, sustain competitive advantage, create greater convenience to users, and serving ‘unbanked’ customers [64], [66], [88].

Commonly, mobile banking is defined as “a channel whereby the customer interacts with a bank via mobile device, such as mobile phone and Personal Digital Assistant (PDA)” [6]. Suoranta and Mattila [77] indicated that mobile banking is among the most recent financial channel today. Several authors have further identified the benefits of mobile banking in terms of ubiquity coverage, flexibility, interactivity, and with greater accessibility compared to conventional banking channels such as Automated Teller Machine (ATM), and non-mobile banking [75], [79]. In line with this, Laukkanen [39] reported that mobile banking was found faster than non-mobile internet banking with the intensive development of advanced mobile technologies.

Although mobile banking yields enormous benefits, numerous scholars found that mobile banking adoption still remains at infancy stage [16], [39], [51], [76]. Meanwhile, Kleijnen et al. [35] further indicated that the usage of mobile banking has yet to meet the industrial expectations. For example, Malaysia Communication and Multimedia Commission (MCMC) [54] through the Hand Phone Survey reported that only 7 percent out of 33.5 percent of mobile users who are aware of mobile banking services registered with the banks for such purpose. Despite the fact that numerous mobile banking adoption studies have been investigated by Luarn and Lin [51], Mattila [56] and Zhou et al. [88], regrettably, most studies were conducted in countries such as Korea [9], [34], Singapore [69], Brazil [13], [68], Taiwan [51] and China [88] with relatively little attention paid to developing countries like Malaysia. As the dynamic growth of mobile penetration were mainly driven by developing countries [80], thus, the findings from developing countries such as Malaysia remains interesting.

Therefore, this paper aims to bridge the gap by extending the Technology Acceptance Model (TAM) to investigate mobile banking acceptance in Malaysia. More specifically, the objective of this study is to examine the relationships between constructs of perceived usefulness, perceived ease of use, social norms, perceived risks, perceived innovativeness, and perceived relative advantages towards behavioural intention in adopting mobile banking. The structural flow of this paper begins with overview of the mobile banking in Malaysia and followed by literature review. Thereafter, based on review of literatures, we developed our hypotheses and research framework. Then, the data analysis and followed by the findings and discussion. Lastly, this paper ended with the implications, limitations and future research recommendations.

2 Literature Review

2.1 Overview of Mobile Banking in Malaysia

Prior empirical and conceptual studies indicated that pioneering new products will gain better sustainable competitive advantage in business [32], [37], [44], [49]. As technological innovation was found to be one of the ways to achieve competitive advantages, thus it is not surprising that Malaysian banking institutions are competing with each other to embrace their mobile banking services. For example, Standard Chartered claimed to be the first bank that applies smartphone technology for mobile banking in the early year of 2007. Subsequently, Maybank declares themselves as the Malaysia’s first financial institution launch mobile banking application - M2UMap using iPhone. Most recently, Bank Islam launched another ‘first truly banking service’ in 2010 in which it enables users to perform their banking transactions anywhere and anytime without internet connection. Kim et al. [33] indicated mobile banking can be launched in two different technological solutions, namely cell-phones with an embedded chip-set and WAP-based with internet connection. Although variety of technological solutions was aggressively launched in mobile banking applications, the usage of mobile banking transactions is still in the infancy level [5]. In fact, Bank Negara Malaysia [5] reported a slight increase of 35.01 percent of mobile banking subscribers in year 2010 (8,487,000 subscribers) with penetration rate of 3.0 percent—among the entire populations and 2.5 percent—among the mobile subscribers respectively. Even though the overall development of mobile banking was found to be slow, numerous scholars foresee the prospect of mobile banking would appear to be one of the established banking channel [67] in future and it was expected to be the most typical application in mobile commerce [46].
Table 1: Mobile Banking Subscribers (Bank Negara Malaysia [5])

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Subscribers</th>
<th>Penetration rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>127,6</td>
<td>0.5</td>
</tr>
<tr>
<td>2006</td>
<td>246,7</td>
<td>0.9</td>
</tr>
<tr>
<td>2007</td>
<td>345,7</td>
<td>1.3</td>
</tr>
<tr>
<td>2008</td>
<td>529,6</td>
<td>1.9</td>
</tr>
<tr>
<td>2009</td>
<td>628,6</td>
<td>2.2</td>
</tr>
<tr>
<td>2010</td>
<td>848,7</td>
<td>3.0</td>
</tr>
</tbody>
</table>

2.2 Factors that Drives Mobile Banking Adoption

With the advancement of technology, the attempts to examine individual’s acceptance in new technology has emerged as one of the most fast growing area in IS research [27]. According to Davis [15], the acceptance and rejection of technology acceptance can be predicted by using TAM which demonstrates the relationship connecting belief, attitude (e.g. use of a certain information system) and action purpose (e.g. a standard to measure if personnel would use the system). However, Mathieson [55] argued that it is insufficient to rely only on both constructs of perceived usefulness (PU) and perceived ease of use (PEOU) in investigating user’s technology acceptance. Hsu and Lu [27], in their study supported that both factors of TAM model were not exactly reflecting the acceptance of mobile banking. Hence, Riquelme et al. [69] suggested there are other possible factors that might affect mobile banking adoption such as perceived risk [9], [16], [52], perceived uncertainty [39], perceived system quality [36], [51], financial cost [85], perceived usefulness and perceived ease of use [9], [43]. In view of the different constructs being used, this paper extends the TAM by including relative advantages, perceived risk, and personal innovativeness in which these constructs are believed to affect the behavioral intention to adopt mobile banking. The proposed research framework is shown as in Figure 1 below.

![Research Framework](image)

3 Hypotheses Development

3.1 Perceived Usefulness and Perceived Ease of Use

The original TAM model that use to predict user’s technology acceptance consists of two constructs namely perceived usefulness (PU) and perceived ease of use (PEOU). PU refers to “the degree to which a person believes that using a particular system would enhance his or her job performance” [15] whilst PEOU is defined as “the degree to which a person believes that using a particular system would be free of effort” [15]. Studies by Chung and Kwon [9] demonstrated that the constructs of perceived usefulness and perceived ease of use were positively related to behavioral intention to adopt mobile banking. Similarly, Lee et al. [43] reported that PU and PEOU were found to be significantly affecting consumers’ intention to use mobile banking. The findings further asserted that PEOU has greater impact than PU. This can be explained through the features of spontaneous system which results the construct of ease of use to be a strong determinant in mobile banking adoption. Thus, this study has postulated to test the following hypotheses:

H1. Perceived usefulness has positive significant relationship towards mobile banking adoption.

H2. Perceived ease of use has positive significant relationship towards mobile banking adoption.
3.2 Social Norms

Pedersen and Ling [63] emphasized that the construct of social influence cannot be ignored in any adoption model. Thus, it is not surprising that social norms have been widely validated in group-oriented IT [78], email acceptance [21], [31], online games [27], internet banking [8] and mobile banking adoption [69], [72]. In some research, social norms are also known as subjective norms [87]. It is defined as an individual’s “perception that most people who are important to him think he should or should not perform the behavior in question” [20]. Meanwhile, Riquelme and Rios [69] explained that the opinions and influence of friends, family, and relatives are important in making a decision to adopt a new product and service. Puschel and Mazzon [68] further asserted that social norm is one of the most vital determinants that manifest the user to adopt mobile banking. Empirically, this has proven by Schepers and Wetzelis [72] with the same findings where social norms found to have significant relationship with behavioral intention. Thus, the following hypothesis is postulated:

H3. Social norms have positive significant relationship towards mobile banking adoption.

3.3 Relative Advantages

As compared to other banking channels, mobile banking offers convenient benefits in terms of mobility which are not available by traditional off-line banking and non-mobile internet banking [4], [41], [48]. For example, the benefits can be viewed in terms of greater convenience, user friendliness, shorter waiting time, and faster response [14], [57], [58], [82]. In other words, the more individual perceived the relative advantages from mobile banking, individual will tend to have more positive attitudes towards it [68]. This is important to reduce consumers’ social and psychological risks perception [42]. Moreover, Karahana and Limayem [31] also explained the impact of innovation characteristics on adoption and usage behavior and they found that relative advantage was significantly affecting both adoption and usage. Meanwhile, in the study by Moore and Bensasat [60] revealed that perceived relative advantage on technological innovation has positive impact to increase the adoption rates. Therefore, we postulate the following hypothesis:

H4. Relative advantages have positive significant relationship towards mobile banking adoption.

3.4 Perceived Risk

Perceived risk is the “uncertainty about the outcome of the use of the innovation” [22]. In fact, perception of risk among individuals has been proved in technology adoption literature as an important element in acquiring new technology or services [38]. With the considerations of security issues, Riquelme and Rios [69] further supported that risk factor is a vital element in investigating mobile technology adoption. As mobile banking is revolutionized from internet banking, therefore mobile banking tends to have similar risks as internet banking [42]. Despite of the risks, the issues of lose and theft of daily transactions via mobile phones lead to the greatest risk as compared to internet banking [69]. According to Malaysia Communication and Multimedia Commission (MCMC) [53], a mobile phone theft and reuse issue is a major problem in many countries around the globe. Inevitably, such trend is wide spreading and increasing in Malaysia. This implies that the greater the potential of loss of theft resulting higher perceptions towards security risk [59]. Subsequently, this discourages users to adopt new technology [57]. A recent studies conducted by Luo et al. [52] found that user’s perception of risk is a crucial driver to determine innovative technology acceptance. The findings show that perceived risk has negative significant relationship towards behavioral intention on mobile banking adoption. Thus, we propose the following hypothesis:

H5. Perceived risk has negative significant relationship towards mobile banking adoption.

3.5 Personal Innovativeness

Personal innovativeness usually re as “a key individual characteristic variable of the adoption and diffusion of the innovation and is related to the users’ time of adoption of the new information technology” [70]. In fact, the conceptualization of consumer innovativeness has been used to investigate user behavior in the acceptance of new products and services [84]. For instance, prior research had shown that personal innovativeness has strong influence in determining technology acceptance [2], [47] in the perspective of internet shopping [10] and mobile commerce [28]. The relationship implies that innovative users tend to accept new technology more positively [71], [81]. Agarwal and Prasad [2] also found that innovative individuals will have higher tendencies in developing positive beliefs on new technology especially when the beliefs are developed through amalgamating of information from various media. Meanwhile, Joseph and Vyas [30] asserted that innovative users perceived lower risk and much open-minded. Besides, this group of users is more active in searching information for new ideas [50]. Therefore, we postulate the following hypothesis:

H6: Personal innovativeness has positive significant relationship towards mobile banking adoption.
4 Methodology

In this section, we discuss sampling and data collection procedures. Followed by variables operational measurement and statistical tests used to evaluate hypotheses.

4.1 Sampling and Data Collection

The objective of this study is to explore the relationships between influential factors and consumer adoption in mobile banking in Malaysia. Target respondents of this study are individuals who are mobile device users that are more likely to adopt mobile banking. Both online survey and paper-and-pencil survey method were used for data collection. The mix methods were applied to minimize the coverage bias resulting using only one data collection method [83]. A sampling size of 400 questionnaires was equally distributed by using online survey and paper-and-pencil method. Out of the 400 questionnaires that sent out, 175 were completed and returned, recorded a response rate of 43.75 percent.

A pre-test was performed which involved 30 lecturers who are familiar in information system area to access survey’s items sequences and contextual relevance. Feedbacks were collected and solicited to improve the overall design and understanding of items in questionnaires.

4.2 Variable Measurement

4.2.1 Independent Variables

Independent variables in this study were accessed with items adapted from existing literatures. All the variables are tabulated in Table 2. There are six independent variables used in this study, specifically, PEOU, PU, SN, PR, RA, and PI. Each of these variables measured between three to six questions which tailored with the mobile banking context. Hence, a total of 22 questions were constructed and captured the intention to adopt mobile banking. Responses to these questions were measured by a five-point Likert scale. For example, “1” denoted as strongly disagree, “2” denoted as disagree, “3” denoted as neutral, “4” as agree, and “5” as strongly agree.

4.2.2 Dependent Variable

A total of three questions were developed to measure the users’ intention towards the adoption of mobile banking. A five-point Likert scale were applied to measure the responses, ranging from scale “1” as strongly disagree to scale “5” as strongly agree.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Number of items</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Ease of Use (PEOU)</td>
<td>4</td>
<td>Davis [15]</td>
</tr>
<tr>
<td>Perceived Usefulness (PU)</td>
<td>4</td>
<td>Davis [15] and Shih [73]</td>
</tr>
<tr>
<td>Social Norm (SN)</td>
<td>3</td>
<td>Riquelme and Rios [69]</td>
</tr>
<tr>
<td>Perceived Risk (PR)</td>
<td>3</td>
<td>Agarwal and Prasad [2] and Crespo and Bosque [12]</td>
</tr>
<tr>
<td>Relative Advantages (RA)</td>
<td>4</td>
<td>Kim et al. [34]</td>
</tr>
<tr>
<td>Personal Innovativeness (PI)</td>
<td>4</td>
<td>Goldsmith and Flynn [23] and Lee et al. [43]</td>
</tr>
<tr>
<td>Behavioural Intention (BI)</td>
<td>3</td>
<td>Gu et al. [25]</td>
</tr>
</tbody>
</table>

4.3 Data Analysis

4.3.1 Profile of Respondents

The demographic profile from surveyed respondents is shown in Table 3. The gender distribution of respondents is 40 percent for male and 60 percent for female. The breakdown of age groups is dominated by the group of 21-25 which consist of 59.4 percent. This is followed by age 20 and less with 20.6 percent. Majority of respondents have bachelor degree qualification with 56.6 percent, no college degree with 21.1 percent and master degree with 12 percent.

In this research, most of the respondents own basic phone (55.4 percent). Second highest ranked by 3G mobile phone with 28 percent. The data also showed that among the respondents, 85.7 percent of them do not have mobile banking experience. Only 14.3 percent of them experienced mobile banking services.
### 4.3.2 Factor Analysis

Factor analysis was performed on the six independent variables - perceived usefulness, perceived ease of use, social norms, relative advantage, perceived risk, and personality innovativeness. The independent variables consist of 22 items (i.e. after deleted 3 items due to the poor factor loadings). The results of the factor analysis for the independent variables are summarized in Table 4.

Likewise, factor analysis was conducted to check the dimensionality of the dependent variable (i.e. intention to use mobile banking). The result of factor analysis for intention to use mobile banking is summarized in Table 5.

### 4.3.3 Reliability

The reliability of independent variables and dependent variable were tested. The measurement of Cronbach's alpha was showed in Tables 4 and 5. Table 4 displays the reliability coefficients ranged from 0.708 to 0.877 and Table 5 showed that the Cronbach's value is 0.860. According to Hair et al. [26], the reliability coefficient of variables are acceptable if the Cronbach's alpha is greater than 0.70. Therefore, the instruments that measure intention to adopt m-banking were reliable.

### 4.3.4 Correlation Analysis

The purpose of Pearson correlation analysis is to examine the bivariate relationships among variables. Table 6 presents correlation coefficients among dependent variable and independent variables. The highest correlation shown in the table is 0.401. According to Field [19], correlation coefficient should be below 0.8 to avoid multicollinearity. Hence, there is no multicollinearity problem in this study. The associated pairs of PEOU, RA, and PI are significant at level 0.01.
Table 6: Pearson’s Correlation Analysis of the Independent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Perceived Usefulness</th>
<th>Perceived Ease of Use</th>
<th>Subjective Norms</th>
<th>Relative Advantage</th>
<th>Perceived Risk</th>
<th>Personal Innovativeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>0.347**</td>
<td>0.095</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subjective Norms</td>
<td>-</td>
<td>-</td>
<td>0.092</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Relative Advantage</td>
<td>0.276**</td>
<td>0.095</td>
<td>0.092</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Perceived Risk</td>
<td>-0.008</td>
<td>0.167*</td>
<td>0.029</td>
<td>0.045</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Personal Innovativeness</td>
<td>0.288**</td>
<td>0.354**</td>
<td>0.401**</td>
<td>-0.100</td>
<td>0.195**</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: **Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

4.3.5 Multiple Regression Analysis

Multiple regression analysis was carried out to analyze the relationship between one dependent variable to several independent variables [26]. Therefore, multiple regression analysis was an appropriate method to examine the relationships between independent variables and dependent variable in this study.

Variance-inflation factor (VIF) is applied to test for multicollinearity among influential factors. As shown in Table 7, all the tolerance indicators are greater than 0.1 with VIF value less than 10. Hence, the results proved that there is no multicollinearity presence in this study [61], [62].

The F-statistics for this study was significant at 1 percent level (Sig. F<0.1), showing the fitness of the model. For the coefficient of determination, $R^2$ stated 0.372, indicating that 37.2 percent of the changes in IU to adopt m-banking can be explained by the changes in the six variables. The individual model variables indicate that PU ($p < 0.05$), PEOU ($p < 0.05$), PR ($p < 0.05$), RA ($p < 0.01$), and PI ($p < 0.01$) positively and significantly affect the IU of m-banking. Contrary, SN ($p > 0.05$) had no significant relationship with consumer IU to adopt mobile banking.

Table 7: Results of Multiple Regression Analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized coefficients</th>
<th>f</th>
<th>Sig.</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>0.587</td>
<td>0.433</td>
<td>1.356</td>
<td>0.177</td>
<td>1.018</td>
<td>1.218</td>
</tr>
<tr>
<td>PU</td>
<td>0.218</td>
<td>0.094</td>
<td>0.159</td>
<td>2.323</td>
<td>0.021</td>
<td>0.801</td>
</tr>
<tr>
<td>PEOU</td>
<td>0.177</td>
<td>0.075</td>
<td>0.160</td>
<td>2.352</td>
<td>0.020</td>
<td>0.806</td>
</tr>
<tr>
<td>SN</td>
<td>0.025</td>
<td>0.052</td>
<td>0.033</td>
<td>0.490</td>
<td>0.625</td>
<td>0.823</td>
</tr>
<tr>
<td>PR</td>
<td>-0.125</td>
<td>0.052</td>
<td>-0.147</td>
<td>-2.388</td>
<td>0.018</td>
<td>0.982</td>
</tr>
<tr>
<td>RA</td>
<td>0.209</td>
<td>0.061</td>
<td>0.220</td>
<td>3.416</td>
<td>0.001</td>
<td>0.903</td>
</tr>
<tr>
<td>PI</td>
<td>0.279</td>
<td>0.067</td>
<td>0.305</td>
<td>4.151</td>
<td>0.000</td>
<td>0.693</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.372</td>
<td>0.349</td>
<td>1.108</td>
<td>1.018</td>
<td>1.215</td>
<td>0.806</td>
</tr>
</tbody>
</table>

Note: **Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

5 Discussion

5.1 Relationship between PU, PEOU, and BI

Our findings revealed that PU has positive relationship in examining the intention to adopt mobile banking in Malaysia. The findings were consistent with studies from Chung and Kwon [9]. Lee et al. [43] and Luarn and Lin [51]. This result implies that if mobile banking is useful and beneficial, users are more likely to adopt mobile banking services. Therefore, banks should emphasize the benefits in the aspects of cost savings, ubiquity, flexibility, and mobility by using mobile banking services. Eventually, banks might educate users the benefits of using mobile banking services through promotional mix such as personal selling, advertisements, sales promotions, and public relations. In addition, banks may continue to innovate more useful features and services. For instance, Bank Islam launched ‘Transact on Palm (TAP) Mobile Banking-I’, the Malaysia’s First Truly Mobile Banking service that enable users to perform banking transactions without internet access. Hence, by providing more useful service, thus user will be more attracted to adopt mobile banking.
Similarly, PEOU was found to have positive relationship to adopt mobile banking. This is consistent with the prior studies such as [3], [9], [43]. Cohen [11] argued that “bankers have to move beyond thinking of mobile banking as a subset of transactions from online banking that they can simply move to the mobile phone”. In fact, banks should simplify the usage of mobile banking services and continue to design more user-friendly system interface. In addition, banks should provide adequate information and clearer guidance to encourage users to use the service. For example, the demonstration can be performed by uploading the steps to perform mobile banking services on bank official websites, social networking sites, or video-sharing sites like “Youtube”. Once users have learnt the fundamental skills on how to operate mobile banking, a positive ease of use feeling will be developed among users.

5.2 Social Norms

Social norms were found to have insignificant relationship towards the intention to adopt the service. The results were contradicted with the findings from [68], [69], [72]. One possible explanation to the results might due to the influences from social forces such as voluntariness. In the study of Lu et al. [50] and Venkatesh and Davis [81], they supported the phenomenon that SN will tend to have less effect if the use of service is on voluntary base. Subsequently, Bauer et al. [7] also revealed the same finding that social norms have only slight influence on behavioral intention; interestingly, their study also found that personal attitude is a moderating factor for social norms to influence behavioral intention in adopting mobile banking.

5.3 Relative Advantage

Relative advantage was found to be significant in determining the intention to use mobile banking. The results were consistent with Pikkarainen et al. [65] and Venkatesh and Davis [81]. Practically, users are more likely to adopt mobile banking if they believe using mobile banking will gain more relative advantages as compared to other traditional banking channels such as ATM or non-mobile internet banking. Hence, banks should emphasize the benefits that they can offer through this alternative banking channel. Specifically, competitive matrix should be used by banks to highlight the benefits over other banking channels. Therefore, the more relative advantage perceived by users, the higher possibility consumer will be attracted to adopt mobile banking.

5.4 Perceived Risk

Even though several studies found that security issues are not the main inhibitor in mobile banking adoption [40], [76], our findings show that there is negative significant relationship between perceived risk and mobile banking adoption. This implies that individuals perceived higher risk and uncertainty incurred in adopting mobile banking. Significantly, these findings were found to be consistent with Luo et al. [52] and Mitchell [59] in which perceived risk is one of the critical factors to be focused while designing and developing a mobile banking service. Therefore, it is important for banks and service providers to project higher security when providing mobile banking services in order to yield higher consumers’ acceptance. In fact, banks and service providers should continuously innovate and offer better security and reliable applications to enhance users’ confidence towards mobile banking services.

5.5 Personal Innovativeness

Numerous studies found that PI has significant influence on the acceptance on IT [81], internet shopping [17], web broadcasting [45], [74]. In this study, our findings revealed that PI has positive significant relationship towards the intention to adopt mobile banking services. The results were consistent with Lee et al. [43]’s studies. This simply means that those users with high innovativeness are more likely to explore and adopt mobile banking services. Generally, high innovative individuals are usually the trendsetters along with high social economic status [29], hence, banks should formulate the marketing strategy (i.e. buzz marketing) to attract ‘innovators’ and ‘early adopters’. Even though both categories only representing small segment of target market, they play an important role to influence others such as ‘early majority’ to adopt mobile banking services.

6 Implications

In this section, first we articulate the implication of this study. Followed by the limitations and future studies and ended with the conclusion of the paper.
6.1 Theoretical Implications

From theoretical point of view, firstly this study successfully extended TAM in the context of mobile banking with the inclusion of four new constructs namely, personal innovativeness, perceived risk, relative advantage, and social norms. The extended model of TAM provides clearer understanding of the factors influencing mobile banking adoption in Malaysia. Secondly, the findings significantly contribute to the existing mobile banking literature. Interestingly, factor personal innovativeness (PI) is the most influencing factor in the adoption of mobile banking. As expected, perceived risk was found to have negative relationship with the adoption. However, social norms were the only factor found insignificant towards intention to adopt mobile banking. In fact, the findings contradicted some of the previous studies.

6.2 Management Implications

With the massive investment and efforts contributed in developing the mobile banking facilities, the varieties of convenient functions invented by mobile technology has greatly encouraged mobile users to engage in mobile banking services. After reviewing the findings of this study, there are several important implications suggested for banks, service developers and software engineers in order to provide better strategic insight to design and implement mobile banking services that yield higher consumer acceptance in Malaysia. As PU, PEOU, RA and PR were found to be the factors that influence consumers’ behavior intention in adopting mobile banking, service developers and software engineers should focus on the development of mobile banking facilities. This can be achieved by developing better functions in terms of flexibility, security and accessibility features to enhance consumers’ confidence to adopt mobile banking services. Since the perceived risk greatly influence consumers’ behavioral intention, thus security is one of the important factors to stimulate customers’ confidence level to adopt mobile banking services. The mobile banking service providers should enhance the security features consistently by practicing transparency management during the process of monetary transactions. In this sense, it is important to build trustworthy business reputation in a long term perspective. Lastly, in the views of personal innovativeness demonstrates a positive-significant relationship towards mobile banking adoption; thus the banks can promote and create awareness to the public through highlighting the benefits or advantages that can be gained from the mobile banking services to stimulate the adoption level among the mobile users. Instead, such promotion also provides better exposure and awareness to the non-mobile banking users to have positive impression towards mobile banking services and utilize the application in future.

7 Limitations and Future Studies

There are several limitations evidenced in this study. These limitations should be considered for future research and improvement. Firstly, the empirical evidence of this study is collected within the Malaysia and the results may not be generalized and inapplicable to other nationalities. Since the adoption and usage of mobile technology are highly varies across countries with different adoption levels and perceptions [1], [96]. Hence, researchers may want to further research on multi-nationalities through expanding geographical areas to gain better generalizations in future studies. Secondly, the measures of constructs are collected at the same point of time in this study. Therefore, individuals’ perceptions and intention to use mobile banking may change over time as an unremitting process due to greater experience and advancement of mobile technologies for the time being. As a result, it is recommended to conduct a longitudinal research to examine the mobile banking adoption at multiple points of time during decision adoption process.

8 Conclusion

In conclusion, the paper aims to investigate the factors that influence the adoption of mobile banking in Malaysian perspective. The findings of this study revealed that perceived usefulness, perceived ease of use, relative advantages, perceived risks and personal innovativeness were the factors affecting the behavioral intention of mobile users to adopt mobile banking services in Malaysia. Meanwhile, the social norms were the only factor found to be insignificant in this study. Thus, this research has provided valuable knowledge and information to banks, service developers, and software engineers to enhance consumers’ intention to use mobile banking services in future.

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