

# Mobile Banking Adoption and its Determinants in Malaysia

Zahoor Ur Rehman, Siti Sarah Binti Omar, Shafie Bin Mohamad Zabri, Sonia Lohana



**Abstract:** In electronic banking channels, mobile banking signifies a great innovation. Nonetheless, because of few reasons, customers are not quite sure about its usage. Numerous studies conducted regarding mobile banking adoption in different countries; however, fewer studies have been directed in Malaysia. In this study, we contributed to the research on e-banking adoption, specifically acceptance of mobile banking in Malaysia, and we enhanced our comprehension of customer's attitude towards advanced technology system usage. Like so, it is essential to grasp the aspects impacting the intention to approve mobile banking channel in Malaysia. For the purpose, we suggested a new conceptual model by extending the Technology Acceptance Model (TAM) with new variables that are privacy risk and security risk, which also filled the research gap. The study core objective was to examine the aspects affecting individual's attitude and behavioural intention to use mobile banking services in Malaysia. SEM technique was used through Smart-PLS3 for the analysis of data with a sample frame of 384 based on Krejcie and Morgan. The result revealed a significant and positive relationship between perceived ease of use, usefulness and attitude towards using mobile banking while a negative and significant relationship between privacy risk, security risk and attitude towards using mobile banking in Malaysia.

**Keywords:** Extended TAM, mobile banking adoption, Malaysia, Risk factors, SEM

## I. INTRODUCTION

In Malaysia, the improvement in banking sectors is also shaped by the fast developments in telecommunication diligence. In commercial services, the formation of technology has improved the way of trading [1]. Developments in technology have enabled banks to approve new approaches in offering superior banking services while reducing costs and developing customer's satisfaction at the same time [2].

Also, developed network bandwidth and wireless application technologies have created chances to spread-out formation and practice of mobile banking services [3]. Numerous studies in Malaysia have investigated technology acceptance but fewer researches are conducted regarding consumer's attitude and behavioural intention specifically among the young generation. Mobile banking is clarified as a channel which keeps the capability to operate banking transactions or widely to conduct commercial transactions through mobile phone [4]. Similarly, [5] define mobile banking as a source of interaction through which consumers operate their banking transactions and their accounts using mobile phone, tablet or personal digital assistance.

In Malaysia banking sectors, Maybank Berhad declares as the first bank provided mobile banking services to their customers in 2009 and launch a banking service application called M2UMap for iPhone [6]. Furthermore, at that time in 2009, bill imbursement, prepaid reload and transferring of funds were the dominant mobile banking services of Maybank [6]. Afterwards, in 2010 Bank Islam Malaysia Berhad (Bank Islam) offered mobile banking services without internet access which facilitate their customers to transact anytime everywhere [7]. On the contrary, CIMB Bank Berhad presented the CIMB Clicks and considered much attractive and extensively utilised banking application in Malaysia [8]. According to annual report of Bank Negara Malaysia (BNM), thirteen commercial banks in Malaysia now offer mobile banking services [9]. This remains constant when in November 2017, Bank Negara Malaysia in the report stated that 11.26 million individuals of the total population operate mobile banking services with a penetration rate of 35.6% as compared to internet banking subscribers are 25.2 million with a penetration rate of 79.5% of total population [10]. While mobile phone penetration rate is 144.8% in 2016 [11]. If mobile banking subscribers are compared to a penetration rate of the mobile phone, it is comparatively very low. Also, the per capita amount of transactions conducted through mobile banking is 1.7 relatively very low to internet banking transactions 13.0 [9]. Therefore, this paper finds out the elements which affect consumers' attitude and thier intention towards using mobile banking services in Malaysia.

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## II. LITERATURE REVIEW AND THEORETICAL BACKGROUND

### A. Mobile banking

A service/channel provided by the banks or any financial institute for conducting banking transactions using smartphones or tablet connected to the internet [12].

Mobile banking services can be grouped that is transaction-based; which include transferring funds, payments of utility bills, prepaid reload and online shopping while non-transaction based including balance check, transaction history and verification of transaction [13].

Mobile banking channel has considerable lead advantages to both consumers and banks. Banks turned out to be more capable while serving and helping their customers as they reduce operational expenses and time although making available meaningful convenience [14], [15]. Furthermore, mobile banking services made it potential for consumers conducting banking transactions anytime and anywhere [16]. Alike, the adoption of technology provides comfort to the customers, whereas it comes up with productivity to the organisations. Intrinsically, mobile banking services usage lead to excellence service delivery [17]. The advantages might only appear if mobile banking services are accepted by the proposed consumers [12], [16].

### B. Technology acceptance model (TAM)

TAM is adapted from “Theory of Reasoned Action” (TRA) by Fred Davis in 1989. Davis also suggested that consumer’s actual usage of motivation is ascertained by the factors which are perceived usefulness, perceived ease of use and attitude of individuals towards using a specific system facilitated by their behavioural intention to use [18].

Perceived usefulness (PU) and perceived ease of use (PEOU) are the key variables of TAM. [18] defines PU as “the potential consumer’s personal likelihood that using a particular system will increase his/her job performance within an organisational circumstance” and perceived ease of use is defined as “the degree to which the potential consumer believes the target system would be effortless”. PU is related to value and PEOU is related to the effort [19]. Consumer’s attitude is guided by PU and PEOU that affects in consumer’s behavioural intention which ultimately stimulates the actual usage [18], [20].

[20] in his study used TAM model to investigate the factors of behavioural intention concerning mobile banking and confirmed that PU and PEOU has significant relationship with behavioural intention to use mobile banking. Similarly, [21] in Taiwan, examined the causes affecting consumers intention to implement mobile knowledge management, the study acknowledged that there is a greater effect of PU and PEOU on individual’s attitude whereas PU expressively affect behavioural intention and attitude affects the behavioural intention of individuals to actual usage [21].

[22] recommended that TAM must be extended by

adding extra variables so that to deliver better details and prophecy of consumer’s behaviour or intention towards the acceptance of innovative technologies. Different studies have added different constructs to TAM such as relative advantage, subjective innovativeness and social norms by [23], perceived risk, cost, compatibility with lifestyle, perceived reliability, trust and needs [24], self-efficacy [25], perceived value, intention to use, perceived ease of adoption and usage activities [26], perceived security [27] and self-efficacy (SE), institutional support, anxiety, and voluntariness [28], perceived benefit [29], customer awareness [30], social image [31]. Regarding this study the researcher tried to extend the TAM with perceived security and privacy risk to investigate consumer’s behavioural intention concerning mobile banking services in Malaysia.

### C. Perceived Usefulness (PU)

PU is the step in which consumers have faith in, that adopting the specific system would enrich job performance [18]. Numerous studies conducted in perspective to mobile services, researchers surveyed that perceived usefulness is the vigorous aspect defining the adoption of new technology like mobile banking since the users come to know about its usefulness [32]–[34]. Hence, it is predictable that the usefulness of mobile banking has significant relationship with consumer’s attitude, intention and usage behaviour. An empirical study conducted by [35], the results declared that PU of mobile banking is the main compelling variable clarifying consumers attitude towards mobile banking [35]. According to [36], bank customers use mobile banking services because the system appears useful for their banking transactions.

On the other hand, it is also useful for banks in minimizing their affiliated branches which in terms affect huge costs [36]. [29] pointed out that PU positively and significantly affects behavioural intention and attitude towards using mobile banking in Malaysia. Studies conducted regarding information technology innovations most of the studies approve the essential effect of PU in understanding users attitude and intention [27], [37]–[40]. In Malaysia studies conducted in perspective to mobile banking, it is found that PU is the influential factor affecting adoption of mobile banking [29], [41]. Perceived usefulness is thus expected having significant relationship with consumers’ attitude, intention and usage behaviour towards mobile banking in Malaysia.

- H1: Perceived usefulness significantly effects behavioural intention to use mobile banking.
- H2 Perceived usefulness significantly effects attitude towards using mobile banking.

#### D. Perceived Ease of Use (PEOU)

Perceived ease of use is the degree to which individuals believe that using a specific system will be easy to use [18]. The easy technology is to use for the benefit of an individual, the more advantageous it can be and this way increase the customer's adoption and usage [19]. PEOU is a vigorous construct of TAM and a key factor affecting the acceptance and adoption of innovative technology [42]. PEOU has direct and indirect relationship with behavioural intention through PU and is the primary barrier that individual has to overcome for acceptance, adoption, and usage of a technology [18], [42]. According to [43] when consumers find mobile banking easy to learn and operate their perception towards its acceptance will increase. [25] conducted a study and found that PEOU has significant effect on Singaporean's intention towards mobile banking adoption. Additionally, [44] stated that the more an individual's observation about the system as being easy to use, the more expected the individual develops a positive attitude towards using it. The relationship between PEOU and attitude has been hypothesized and endorsed by various studies [39], [40], [45], [46]. Hereafter, the hypothesis is developed that:

- H3; Perceived ease of use significantly affect consumers attitude toward using mobile banking.

#### E. Perceived Privacy Risk

[47] defines privacy as the certainty of security which secures entities from the collection, storage, and spreading of info and the potential endanger causing from the unofficial issue of that info. Likewise, [48] declare that assault of privacy is a circumstance in which somebody tries to discover insights about someone else's privacy issues in a way that is disquieting and a rule illicit. [49] exposed that 93 per cent of web users in the United States denied providing personal data over the internet because of not trusting most websites when making purchases online.

Privacy of mobile banking transactions is critical and the risk gets heightened after the consumer's privacy gets in the hands of the hackers and phishers [50], [51]. Further [33] stated that privacy problems are the real worry for users while using mobile banking services. Furthermore, [52] mentioned his/her perceived privacy control totally determines that customer's willingness to deal online. A study conducted by [53], indicated privacy concerns which affect consumer's choice to use mobile banking for future in India; study results revealed that privacy hazards adversely impact user's attitude towards mobile banking adoption. Increased in the perception of risks decreases the acceptance and adoption of technology. And so, the hypothesis is developed that:

- H4; Privacy risk significantly affect consumers attitude towards using mobile banking.

#### F. Perceived Security Risk

[54] define perceived security as the intensity of security individual feels before purchasing across the internet. Furthermore, [55] stated that security had postured genuine

progressing difficulties to the continuous development in e-commerce adoption. Individuals who regularly exchange with sensitive data, security consciousness, are essential issues for them [56]. In the perspective of mobile banking, customer's attitude about security depends to a great extent on how sure the bank can hold them to feel that his/her personal information is secure [56]. Security concerns have reserved consumers from resorting to both electronic banking and mobile banking channels [57].

Consumers habitually think that conducting online transactions via the internet improves the probability of misconducts [58]. The lack of self-confidence in the degree of a given security may fear consumers that their money may be withdrawn without notice from a bank account. Risks in mobile banking services exist; clients need to be assured that their money and secret information are secured [59]. According to [60] indeed, mobile banking adoption can be delayed when users perceive security fears. Hence, keeping in mind the researcher developed a hypothesis that:

- H5; Security risk significantly affect consumers attitude towards using mobile banking.

#### G. Attitude as a mediator and dependent variable behavioural Intention to use mobile banking

Attitude is "the degree of individual's positive or negative evaluation or appraisal of the behaviour in question" [46] whereas, behavioural intention is the measure of the probability of an individual using the application/system [61]. consumers intention of using new technology is fully dependent on his/her attitude [18]. Concerning to adoption of new technology, various researchers have conducted studies regarding the effect of consumer's attitude on his/her behavioural intention. [62] mention, attitude exists in the mind of consumers, leads and creates behaviour and in such a way can be used to judge intention. [63] also indicated that attitudinal factors describe more fluctuations in e-intention. [64] in their study supposed that the more positive consumer's attitude towards using mobile banking, the greater will be his/her intention to adopt the system.

Studies conducted regarding mobile banking adoption revealed a significant and positive relationship between attitude and behavioural intention towards mobile banking [12], [64], [65]. Similar studies conducted in UAE, Spain, Iran, China, Johannesburg, Republic of South Africa and Malaysia, it is found that consumers' attitude significantly influences their behavioural intention towards mobile banking adoption [29], [39], [66]–[68]. For this study, attitude is hypothesized as a mediator on the relationship between perceived usefulness, perceived ease of use, security risk and privacy risk and behavioural Intention to use mobile banking.

For that reason, the researcher developed the hypothesis that;

- H6; Consumer’s attitude significantly affect behavioural intention to use mobile banking.
- H7; Attitude mediates the relationship between perceived usefulness and behavioural intention.
- H8; Attitude mediates the relationship between perceived ease of use and behavioural intention.
- H9; Attitude mediates the relationship between privacy risk and behavioural intention.
- H10; Attitude mediates the relationship between security risk and behavioural intention.

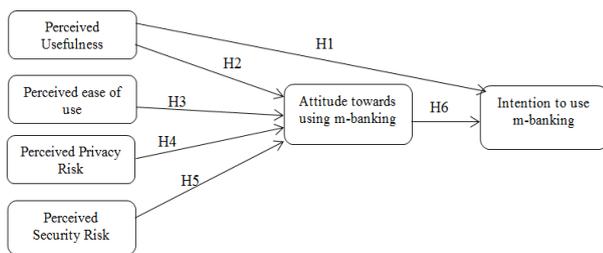


Fig.1. Conceptual framework

III. RESEARCH METHODOLOGY AND RESULTS

A. Variable measurement and data collection

To measurement Malaysian consumers behavioural intention to use mobile banking, the survey items for this study have been adopted from the earlier related studies [56], [69], [70]. [71] suggested the survey questionnaire method is suitable to test the developed hypotheses. English language survey questionnaire was developed for data collection and the questionnaire was assessed by the professionals working in the digital banking sectors and universities in Malaysia. The professional’s idea helps out verifying the suitability for reading the survey queries from the user’s perception of mobile banking to evaluate actual usage. Survey indicators were calculated with seven-point Likert scale, exemplifying strongly agree = “7” to strongly disagree = “1” except demographic variables. A total number of 700 paper and hyperlink survey were sent to respondents. A total of 406 were retrieved, further than 384 questionnaires were able for analysis showing 100% of the sample size based on Krejcie and Morgan. Table I shows a summary of the respondent’s information.

In addition, structural equation modelling (SEM) technique was used to confirm the proposed model. SEM was preferred for the reason of its capability to measure the causal relationships between the constructs with multiple measurement items and its ability to evaluate the measurement characteristics of variables [72]. Carrying out the confirmatory factor analysis (CFA), the minimum sample size is 100 as reported by [73]. For this study, the data set of 384 respondents presented, the confirmatory factor analysis (CFA) was performed by smart-PLS 3.

Table- I. Descriptive statistics of respondent’s characteristics

Characteristics	Sample
<i>Gender</i>	
Male	189
Female	195
<i>Age</i>	
24 years old and below	72
25 - 29 years old	139
30 - 34 years old	92
35 - 40 years old	81
<i>Number of years using a smartphone</i>	
Less than three years	19
Between 4-6 years	25
Between 6-8 years	71
Between 8-10 years	102
More than ten years	167
<i>Respondents adopted mobile banking</i>	
Yes	196
No	188
<i>Mobile banking usage frequency</i>	
Daily	21
Occasionally	72
Only when needed	103

IV. RESULTS AND DISCUSSION

A. Measurement model Analysis

To ascertain that the theory fits the sampled data, the measured constructs were confirmed with reliability and validity analysis. To measure the constructs allied parameters the reflective model technique was used. Following the Rule of Thumb for estimating the measurement model, PLS rule set was calculated to test the measures involving the composite reliability (to evaluate the inner reliability), indicators reliability, convergent validity, AVE and discriminant validity [72].

B. Structural model analysis and hypothesis testing

To evaluate the significance level of path coefficients in PLS-SEM, the bootstrapping method was used. A related thumb rule for calculation of structural model calculation was used to execute the structural model testing.

C. Validity and reliability check

Exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) was directed for evaluating the reliability and validity of the proposed model. Founded from the analysis, the entire 29 indicator’s items of PU, PEOU, security risk, privacy risk, attitude and behavioural intention were retained for the measurement.

The most important thing is that the construct reliability is considered suitable when the scores are in the range of 0.60 to 0.90 [72]. Confirming the convergent validity, further analysis for determining the composite reliability and the AVEs of the latent constructs was performed. Composite reliability mostly used to evaluate the level to which the indicators represent the variable are all the values exceeding the suggested minimum threshold of 0.7 (see Table I). Similarly, the reported AVEs showed that all values meet the recommended limit of 0.5 [72]. Function of the indicator's reliability is to evaluate the factorial loads of each item to determine to what extent they measure the same phenomenon. Given the nature of this study, factor loadings between 0.5 and 0.9 were accepted on their merits, the essence of such is to focus on how each construct theoretically contribute towards the overall evaluation of the proposed research model. Indicator's reliability of all the loadings meet the recommended 0.5 thresholds (see Table II) suggested by [50], [58], [72]. TAM well suits the sampled data, approving the reliability and validity of the precise constructs.

**Table- II. Reliability analysis of the survey items**

Construct	Item	Standardized factor loadings	CR	AVE
<i>Perceived usefulness</i>	PU1	0.655	0.846	0.528
	PU2	0.876		
	PU3	0.736		
	PU4	0.628		
	PU5	0.710		
<i>Perceived ease of use</i>	PEOU1	0.759	0.838	0.565
	PEOU2	0.651		
	PEOU3	0.781		
	PEOU4	0.808		
<i>Privacy risk</i>	PR1	0.836	0.863	0.560
	PR2	0.744		
	PR3	0.832		
	PR4	0.609		
	PR5	0.697		
<i>Security risk</i>	SR1	0.861	0.934	0.741
	SR2	0.751		
	SR3	0.930		
	SR4	0.828		
	SR5	0.921		
<i>Attitude towards using mobile banking</i>	ATT1	0.630	0.940	0.761
	ATT2	0.944		
	ATT3	0.929		
	ATT4	0.900		
	ATT5	0.918		
<i>Behavioral intention</i>	BI1	0.834	0.870	0.575
	BI2	0.804		
	BI3	0.683		
	BI4	0.659		
	BI5	0.796		

**D. Discriminant validity**

Discriminant validity of the latent constructs was executed use up Fornell and Larcker's, (1981) principle, which demands the square root of every construct's AVE, to be higher than the relationship of the latent construct from other constructs in the model. Table iii displays the assessment of the square root of the AVE and the relationships between the variables. Results of the loadings and cross-loadings provide more validation of the discriminant and convergent validity, indicating that the constructs were intensely interrelated with their measures than with any other constructs.

**Table- III. Discriminant validity**

	ATT	BI	PEOU	PR	PU	SR
<i>ATT</i>	<b>0.872</b>					
<i>BI</i>	0.706	<b>0.758</b>				
<i>PEOU</i>	0.233	0.326	<b>0.752</b>			
<i>PR</i>	-0.200	-0.414	-0.488	<b>0.749</b>		
<i>PU</i>	0.415	0.232	0.249	-0.026	<b>0.726</b>	
<i>SR</i>	-0.083	0.056	0.493	-0.657	-0.002	<b>0.861</b>

Note: AVE square root is shown in bold at diagonal

**E. Assessment of the significance and relevance of structural model relationships**

To investigate the level of significance among latent variables the bootstrapping technique was conducted ensuring the rule of thumb. The least recommended number for bootstrapping adopted samples was 5,000. For this study values of path coefficient with 5 per cent probability error were considered statistically significant (see Table IV). In summary, perceived usefulness, perceived ease of use, perceived privacy risk and security risk were statistically significant which affect the respondent's attitude towards mobile banking adoption, while attitude and behavioural intention found significant which influence their actual usage of mobile banking (see Table IV). However, perceive usefulness is found insignificant with behavioural intention to use mobile banking. Hence Hypothesis H1 is rejected and H2 to H6 was accepted. It is clear that the significance level of the variables in influencing customer's attitude towards adoption and using mobile banking were 0.02 and lower (see Table IV). In respect of PU and PEOU, the study confirmed that PU and PEOU are the influential factors which affect consumer's attitude and their intention to use mobile banking service in Malaysia, it was revealed that individual's behavioural intention is directly and indirectly influenced by PU and PEOU, suggesting that better experience in practice and easiness leads to habitual technology use [19]. Regarding the findings on perceived privacy and security, research has proven that increase in perception of risks decreases user's intention to use technology [74]-[77].

**F. Coefficients of determination (R<sup>2</sup>)**

The coefficient of the determination (R<sup>2</sup>) shows the estimate accuracy of the constructs in the structural model. R<sup>2</sup> values are considered strong if values are 0.75, moderate (0.50) or weak (0.25), individually. The study model revealed prognostic accuracy R<sup>2</sup> of 0.295 for consumer’s attitude and R<sup>2</sup> of 0.551 for behavioural intention i.e. moderately predictive accurateness (see Table IV).

The R<sup>2</sup> (0.295) represent the combined influence of independent variables which explain almost 30% of the variance in the mediator (attitude). Whereas R<sup>2</sup> value of 0.551 is the combined effect of independent variables and mediator, explains approximately 55 per cent of the variance in dependent variable i.e. behavioural intention (see Table IV).

**Table- IV. Path Coefficient**

H	Beta	std deviatio n	t-value	p-value s	Remarks	R <sup>2</sup>
H1	-0.062	0.041	1.509	0.132	Rejected	0.295
H2	0.357	0.043	8.207	0.000	Accepted	
H3	0.128	0.051	2.528	0.012	Accepted	0.551
H4	-0.389	0.170	2.285	0.023	Accepted	
H5	-0.376	0.078	4.821	0.000	Accepted	
H6	766	0.022	35.242	0.000	Accepted	

Note: \*\* significant at p <0.05

**G. Mediating relationship**

To evaluate the indirect theoretical relationship between constructs, the mediation analysis technique was used. About this study, the attitude was theorised to mediate the relationship between independent variables (PU, PEOU, PR & SR) and dependent variable (BI). Measuring the mediating relationship can help to identify the total relationship among the related variables. With regards to determining the total effects of the exogenous constructs, the bootstrapping total effects technique was used. The bootstrapped results as per Table V; the specific indirect effect column reveals the indirect relationship between each independent variable and dependent variable through mediator (Path 1 & Path 3 via mediator Path 2) while the column of total effect indicates the combined relationship of independent variable, mediator and dependent variable (path1\*path2+path3) (see Table IV). For mediation analysis Variance Accounted for Statistic technique was used i.e. (VAF=Indirect effect/Total effect) [78].

**Table- V. Bootstrapped results for mediation**

H	Specific indirect effect	Total effect	VAF	Remarks
H7	0.273	0.163	1.6	Full mediation
H8	0.098	0.210	0.46	Partial mediation
H9	-0.288	-0.439	0.65	Partial mediation
H10	-0.298	-0.439	0.67	Partial mediation

Note; VAF=Specific indirect effect/Total effect

Following the mediation criteria as suggested by [79], and from the result mentioned above, the VAF of 1.6 shows the full mediating relationship of attitude among perceived usefulness and behavioural intention to use mobile banking,

while the VAF of 0.46 indicates a partial mediating relationship between perceived ease of use and behavioural intention. The VAF of 0.65 and 0.67 indicates the partial mediating relationship of attitude between privacy risk, security risk and behavioural intention [79].

**V. IMPLICATIONS FOR PRACTICE/MANAGEMENT**

To deal with privacy and security risks related to mobile banking services, application developers and banks are instructed to make sure that security actions are dedicated to secure mobile banking service from threats and unauthorised access. Banks need to inform and instruct their customers on how to utilise mobile banking services and avoid third party scams. As well, banks need to adopt lawful and technical arrangements for instance third-party agreements to guarantee security and privacy and need to constantly develop structures for ensuring the reliability of an individual’s information.

This study also recommends mobile banking application developers and bank to give actual consideration for awareness of usefulness and easiness, while designing mobile banking services. Assertive promoting advertisings can be done, attracting consumers to accept mobile banking services. As well, mobile banking has to be exposed as a service that is easy to function and well-matched using customer’s standards, desires, and understandings.

**VI. STUDY LIMITATIONS AND FUTURE RECOMMENDATIONS**

This study deprived of several boundaries; first, the study investigated consumer’s behavioural intention to use mobile banking from the viewpoints of the researcher in Malaysia using the cross-sectional survey design. The sample comprised generation Y respondents aged from 18 to 40 years old. Thus, to simplify the study findings to new locations, a further practical study is desired. Further research should think through the practice of various geographic areas and broaden the argument to bring in innovative technology and a variety of different demographics. Furthermore, data collection from an advanced country and conducting a relative observation would make available better support for the opinions allied to a developing country.

Second, further study might also observe other mediating or moderating constructs. A repetition or relative research in other developed and developing countries would be capable of giving more knowledge on the role of demographic attributes like gender, age, education and monthly income etc. Besides, the study is based on TAM, suggested and confirmed via the technique of PLS-SEM; further studies should investigate consumer’s behavior relating some other theories associated with the technology adoption and acceptance.



Lastly, the study extended TAM with privacy and security risk; future studies should add some other influential factors in the context of mobile banking adoption in Malaysia or any other country.

## VII. CONCLUSION

Development in technology has virtualised the banking and payment systems from traditional banking to “branchless” and the latest one that is “mobile banking” on the large global scales [80]. The study aim was to deliver a more in-depth investigation of the crucial aspects affecting behavioural intention towards adoption or acceptance of mobile banking services in Malaysia.

The findings has proven that perceived usefulness of mobile banking has a significant influence on the consumer’s attitude towards the adoption of mobile banking in Malaysia. It entails that individuals who believe mobile banking as a beneficial tool for their banking activities are expected to accept it. Correspondingly, those who consider mobile banking useless are not expected to accept it. The study findings confirmed the existing studies that perception of usefulness heightens the adoption of latest technologies [12], [13], [24], [31]. In addition, the findings indicate that mobile banking users think operating mobile banking is effortless and is easy to learn it. The study has confirmed from the path coefficient results that perceived ease of use have significant on consumer’s attitude towards using mobile banking and thus the findings are consistent with preceding studies [12], [13], [24], [31].

Obviously, perceived security risk found negatively and significantly affect consumers’ attitude towards mobile banking acceptance in Malaysia. Consumers become unwilling to adopt mobile banking services as they think of risk possibilities. The reasonable explanation is that consumers worried about losing their money due to security worries while operating mobile banking services. The findings of the study are in line with earlier studies [75], [76], [81], [82].

As predicted by the researcher, the findings exposed that attitude positively and significantly affect consumers’ behavioural intention to use mobile banking in Malaysia. Privacy risk associated with mobile banking is essential and the risks become emphasized when personal info leaks by cybercriminals [83]. The findings have confirmed that perceived privacy risk has a significant and negative relationship with the attitude towards using mobile banking. The study findings are constant with earlier studies [53], [56], [84].

## VIII. ACKNOWLEDGEMENT

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