



**THE INFLUENCE OF M-COMMERCE ADOPTION AND
BEHAVIOURAL INTENTION ON OVERALL PERCEIVED USEFULNESS
AND PERCEIVED EASE OF USE: A CASE OF UNIVERSITY STUDENTS
IN MALAYSIA**

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ABSTRACT

Previous studies have explored the adoption of various information technology. However, little is known about mobile commerce adoption among university students especially in the context of Malaysia. Therefore, a study was conducted to propose a theoretical framework based on TAM2 to explain the individual adoption intention towards mobile commerce adoption. This paper presents a basic understanding of the concept of mobile commerce and its business characteristics. Data was collected from 4 public universities in Selangor, Johor, Penang and Terengganu using paper-based questionnaire. The analysis involves 550 valid data set. Based on a thorough literature analysis, a model of determinants towards mobile commerce adoption is presented. The findings from this study could contribute towards the advancement of knowledge in e-commerce area particularly in identifying determinants for mobile commerce adoption among younger generation.

Key Words: M-commerce, Technology Acceptance Model (TAM), Perceived Usefulness (PU), Perceived Ease of Use (PEOU)

Introduction

Nowadays, the internet are the backbone for modern communication and social media are commonly used as online services to create and share a variety of content (Bolton, Parasuraman, Hoefnagels, Migchels, Kabadayi, Gruber, Loureiro,& Solnet, 2013). There are several social media tools that are available for consumers via mobile applications such as Facebook, Instagram, Twitter,Blog and Carousell. The statistics showed that 80.0% of social media users prefer to visit social networking sites and 96.5% of them have Facebook accounts (MCMC,

2016). This indicates that social media tools have become popular platforms for people to communicate, socialise or even do business.

Mobile commerce (m-commerce) involves the use of mobile computing technology which offers extra functionality to existing e-commerce. It covers a large number of services, including mobile financial services (m-banking, m-payment, and m-brokering), mobile shopping (m-retailing, m-ticketing, and m-auctions) and mobile entertainment (m-gaming, m-music, m-video, and m-betting) (Khalifa & Shen, 2008). Generally, generation Y are frequent users of social media and they use these media primarily to stay connected with friends, obtain information and be entertained through technology (Park & Valenzuela, 2009)

However, this generation are intended for communication and entertainment purposes rather than transaction purposes (Goi & Ng, 2011). Recent study by the Malaysia Communication and Multimedia Commission (MCMC, 2016) showed that mobile phone users are using the technology for communication by text (92.7%), getting information (90.1%) and listening to music (64.2%). Nevertheless, the statistics for m-commerce related activities are low. For examples, internet banking (36.2%), shopping (35.3%) and selling goods/services (18.9%). Hence, the report indicated that m-commerce is still at the early stage in Malaysia particularly on the aspect of transaction purposes. In addition, there is still limited number of studies on m-commerce in Malaysia. A library search on the journal articles between 2010 and 2016 shows that only few studies were conducted in this area which are Goi and Ng (2011), Hew, Lee, Ooi, and Wei (2015), and Lee and Wong (2016).

The present study used an integrated model of TAM2 and the original TAM that explains perceived usefulness, perceived ease of use and usage intentions in mobile commerce adoption. Previous studies have found that TAM2 had become a powerful model in predicting user acceptance. However, there has been scant research that applies TAM2 determinants in determining mobile commerce adoption. Most past empirical research have focused on financial affairs or software development and the data were tested by using SPSS analysis. However, studies that apply TAM2 to explore the mobile commerce adoption among university students and used the partial least square (PLS) based SEM techniques (PLS-SEM) are quite limited. Therefore, the researcher aims to provide a better explanation by employing TAM 2 model in m-commerce adoption in Malaysia.

2.0 Literature Review

2.1 E-Commerce and M-commerce

E-commerce is “a commercial transaction that involves the transfer of information across the Internet” (Maamar, 2003). The rapid growth of the Internet and web technologies have seen how the traditional technique in commercial activities has been replaced with new methods such as e-commerce to compete with their rivals in the global market. Nevertheless, m-commerce provides

additional characteristics to the existing e-commerce such as location and localization services (Junglas & Watson, 2008). The shift is mainly due to the unique features such as ubiquity, personalization, flexibility and localization (Eze, Ten, & Poong, 2011). M-commerce is the use of mobile devices in dealing with various transactions such as buying and selling products or providing services to clients at anytime and anywhere through wireless network (Jaradat & Al-Rababaa, 2013). The term “any monetary transaction that is conducted by using a mobile network” is also used in defining mobile commerce (Ngai & Gunasekaran, 2007). This study adopts the definition of m-commerce by Yang (2005) who defined it as an “extension of electronic commerce from wired to wireless telecommunications and have ubiquity characteristics which allow the customers to connect at anytime from anywhere”. Figure 1 shows mobile commerce characteristics and some examples of mobile commerce applications (Samuelsson & Dholakia, 2003).

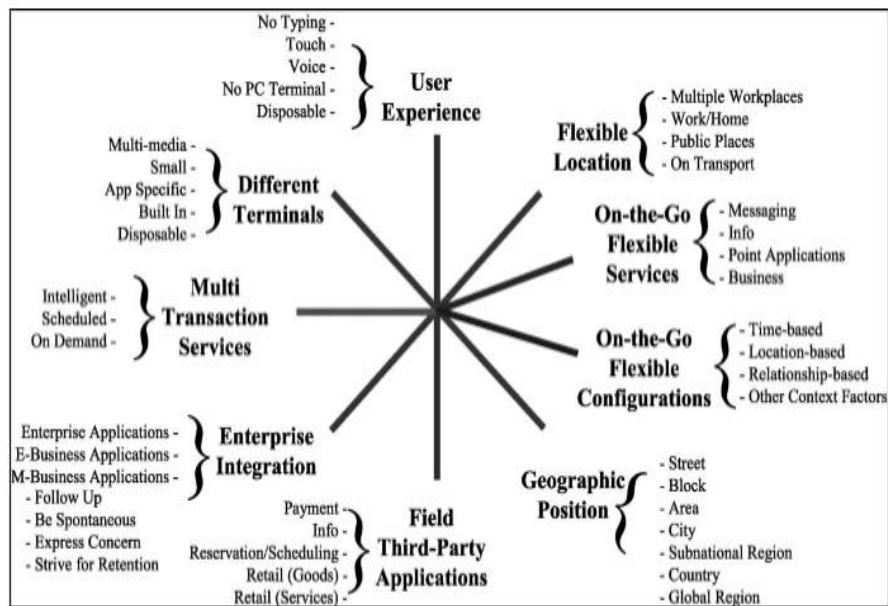


Figure 1: Mobile Commerce Characteristics
Source: Samuelsson & Dholakia (2003)

This study focuses on the mobile commerce usage among university students by applying Business to Consumer (B2C) business model. The examples of B2C m-commerce include mobile financial services (m-banking, m-payment, and m-brokering), mobile shopping (m-retailing, m-ticketing, and m-auctions) and mobile entertainment (m-gaming, m-music, m-video, and m-betting) (Khalifa & Shen, 2008).

2.2 Technology Acceptance Model (TAM2)

Davis (1989) stated that TAM is constructed based from the Theory of Reasoned Action (TRA). TRA explores the relationship between perception and technology usage (Fishbein & Ajzen, 1975). Nevertheless, TAM was developed to explain in detail why users accept or reject an

innovative information system (Davis, Bagozzi, & Warshaw, 1989). Besides that, this model has two determinants which are perceived ease of use and perceived usefulness. Both TRA and TAM model postulate that attitude has the capacity to influence behavioural intention. However, Davis (1989) argued that the effect of subjective norms on behavioural intention to use is only usable in TRA and not TAM. Venkatesh and Davis (2000) claimed that subjective norms may influence one's intention to use, perceived usefulness of a technology and perceived ease of use in TAM2. Therefore, Venkatesh and Davis (2000) developed TAM2 on the basis of TAM to determine the relationship among the variables. This extension of TAM includes two processes, which are social influence processes (subjective norm, voluntariness, and image) and the cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived usefulness). Both processes are integrated into this model. These two processes are important in order to study users' acceptance in technology and system.

3.0 Research Model

The research model in this study was adapted from TAM2 model. This study used an integrated model of TAM2 and TAM. Subjective norm and image represent the social influence process in TAM2. The voluntariness was dropped because usage of the Internet was not being mandated, nor was there any expectation that it would be mandated in future (Chismar & Wiley-Patton, 2002). Additionally, experience also was omitted since this study focused only on early adoption of mobile commerce among university students in Malaysia. Additionally, job relevance construct was also dropped since the focus of this study was the undergraduate students who were presumed to be unemployed while studying. The research model for this study is presented in Figure 2 below.

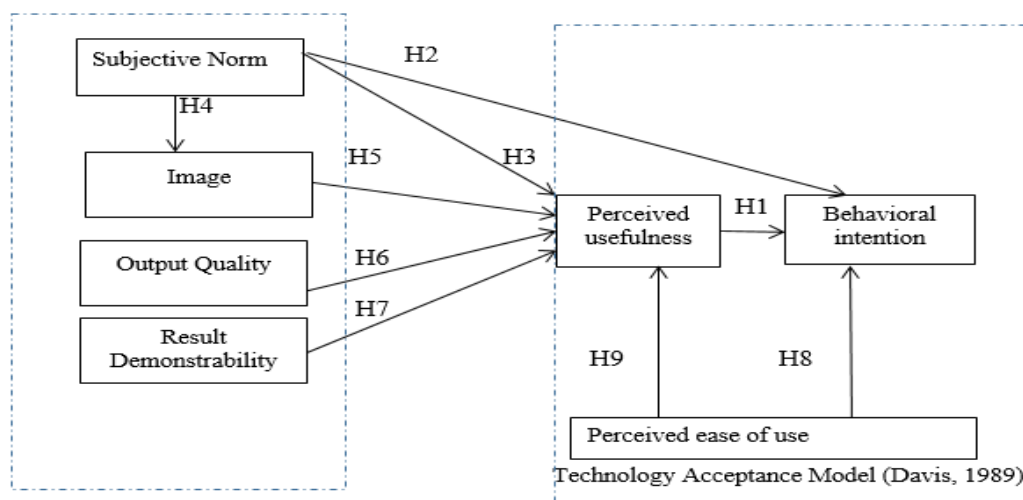


Figure 2: Research Model

Source: Adapted from Venkatesh and Davis (2000)

3.1 Perceived usefulness, perceived ease of use and behavioural intention

Perceived usefulness is the degree to which an individual believes the system or technology to be useful, therefore he/she will be more positive towards using the technology or system. On the other hand, perceived ease of use refers to an individual's perception on whether the technology can enhance his/her performance or not and whether it is easy to use or not (Davis, 1989). Koufaris (2002) recommended that perceived usefulness influence the intention of potential Internet shoppers. Additionally, TAM indicates that perceived ease of use influences intention to use and then affects actual system usage (Wei, Marthandan, Chong, Ooi, & Arumugam, 2009). In the m-commerce perspective, previous empirical studies showed that perceived ease of use has a positive influence in the adoption of m-commerce (Khalifa & Shen, 2008; Wei et al., 2009). Based on the above discussion, the researchers hypothesised that:

H1: Perceived usefulness has a positive effect on the behavioural Intention to use m-commerce among university students in Malaysia.

H8: Perceived ease of use has a positive influence on the behavioural intention to use m-commerce among university students in Malaysia.

H9: Perceived ease of use has a positive influence on the perceived usefulness to use m-commerce among university students in Malaysia.

3.2 The influence of Subjective Norm

Subjective norm is defined as an individual perception that people who are close to him or her think he or she should or should not perform the behaviour (Fishbein & Ajzen, 1975). Moreover, subjective norm is an important factor which shows direct determinant of behavioural intention for TRA (Fishbein & Ajzen, 1975), TPB (Ajzen, 1991), TAM2 (Venkatesh & Davis 2000) and UTAUT (Venkatesh, Morris, Davis, & Davis, 2003). Previous studies also reported that subjective norm has a significant relationship with behavioural intention (Wei et al., 2009; Jaradat & Rababaa, 2013, Faqih & Jaradat, 2015). However, subjective norm had no significance on intention and perceived usefulness in their empirical comparison of TAM and TRA (Davis *et al.*, 1989, & Mathieson, 1991). Besides that, empirical studies also indicate that subjective norm has positive influence affecting image to use technology (Ventakesh & Davis, 2000; Faqih & Jaradat, 2015). Based on the above discussion, the researchers hypothesised that:

H2: Subjective norm positively influences the behavioral intention to use M-commerce among university students in Malaysia.

H3: Subjective norm positively influences the perceived usefulness to use M-commerce among university students in Malaysia.

H4: Subjective norm positively influences the image to use M-commerce among university students in Malaysia.

3.3 The influence of Image

Image will positively influence perceived usefulness through processes of internalization and identification in TAM2 (Ventakesh & Bala, 2008). Previous research consistently reported that image positively affects the perceived usefulness of information technologies' adoption (Teo & Pok, 2003; Chan & Lu, 2004; Faqih & Jaradat, 2015). Nevertheless, Venkatesh and Davis

(2000), found that social constructs such as subjective norm, social factors and image are not significant when the systems usage is optional. Therefore, further study is needed to clarify the effects of image on mobile commerce. Based on the above discussion, the researchers hypothesised that:

H5: Image has a positive influence on the perceived usefulness to use M-commerce among university students in Malaysia.

3.4 The influence of output quality

Ventakesh and Davis (2000) argued that output quality will explain significant variance in perceived usefulness over and above job relevance because a different underlying judgemental process is involved. Additionally, previous studies found that the relationship between perceived output quality directly affects perceived usefulness (Ventakesh & Bala, 2008). Studies in Thailand demonstrated that system quality and service quality play central role in influencing the degree of trust that the consumers have in using internet banking (Namahoot & Laohavichien, 2015). Nevertheless, they suggested that information quality shows negative influence on the use of online banking service. Based on the above discussion, the researchers hypothesised that:

H6: Output quality positively influences the perceived usefulness of M-commerce among university students in Malaysia.

3.5 The influence of result demonstrability

Result demonstrability which is defined as the “tangibility of the results of using the innovation’ will directly influence perceived usefulness” (Moore & Benbasat, 1991). Besides that, Ventakesh and Bala (2008) suggest that the relationship between result demonstrability and perceived usefulness is consistent with the job characteristics model and can enhance knowledge of internet user through the actual results of work activities (Ventakesh & Bala, 2008). In contrast, Faqih and Jaradat (2015) found that although result demonstrability does not support perceived usefulness, it has a positive relationship with behavioural intentions to use m-payment. Based on the above discussion, the researchers hypothesised that:

H7: Result demonstrability positively influences the perceived usefulness of M-commerce among university students in Malaysia.

4.0 Methodology

4.1 Research Design and Method

The purpose of the study is to examine the effect of perceived usefulness determinants (subjective norm, image, output quality, result demonstrability) and behavioural intention to adopt mobile commerce adoption among university students in Malaysia. A structured questionnaire was developed to achieve the objective of the study. The questionnaire used a 7 point Likert Scale ranging from (1) strongly disagree to (7) strongly agree. Moreover, all variables were estimated through reflective measures which were adopted/adapted from previous questionnaires. The measurement items of the questionnaire are adapted from scale items that

were validated and used in previous research studies (Faqih & Jaradat, 2015; Davis et al., 1989; Teo , & Pok, 2003; Hsu, Chang & Chen, 2012). Besides, the instrument in this study consists of two main parts. Part one consists of student background information and part two contains a list of questions related to the determinants on the use in M-commerce among university students in Malaysia.

4.2 Sample and Data collection

In this study, students are selected from public universities and classified into four zones which are Northern region, East coast region, Central region and Southern region in Malaysia. The population of students will be proportionate according to the four universities in Peninsular Malaysia. The four selected universities are ‘Universiti Sains Malaysia’(USM), ‘Universiti Malaysia Terengganu’ (UMT), ‘Universiti Putra Malaysia’ (UPM) and ‘Universiti Teknologi Malaysia’ (UTM). The target population was university students at public universities because they have similar characteristics and can represent the mobile commerce users in Malaysia. A total of 800 questionnaires were distributed of which 750 were returned. However, 200 questionnaires were discarded because the respondents’ do not have experience in using mobile commerce. In this study, the Structural Equations Modelling was used to test the proposed model and the hypotheses.

5.0 Research Result Discussion

5.1 The Content Validity

The content validity is the ability of items generated for a construct in measuring the concept they were designed to measure (Hair, Black, Babin, & Anderson, 2010).Moreover, all the items used to measure a construct must show highest loading values on their respective constructs than their loadings on other constructs. In addition, Andresen (2000) claimed that the item loading should be over 0.30 for the mutual relationships. In this study, there are 3 indicators which are PEC4, RES4, and ANX4 were deleted which consisted of poor loadings as per aforesaid criteria. Tables 1 below presented cross-loadings and loading of the items and Table 2 showed T value results for each item. A total of 3 indicators (PEC4, RES4, ANX4) were deleted which consisted of poor loadings as per aforesaid criteria.

Table 1: Cross-Loadings and Loading of the items

Constructs	Item	BI	I	OUT	PU	RES	SE	SN
Behavioural Intention	BI1	0.810	0.255	0.506	0.431	0.517	0.484	0.553
	BI2	0.838	0.405	0.520	0.504	0.471	0.463	0.598
	BI3	0.886	0.308	0.548	0.491	0.566	0.538	0.615
	BI4	0.883	0.357	0.550	0.514	0.542	0.474	0.645
Image	I1	0.342	0.875	0.362	0.410	0.298	0.352	0.402
	I2	0.365	0.893	0.384	0.421	0.314	0.373	0.414
	I3	0.345	0.887	0.365	0.475	0.349	0.359	0.412
	I4	0.352	0.836	0.433	0.414	0.373	0.436	0.418
	I5	0.262	0.832	0.332	0.380	0.319	0.330	0.314
Output Quality	OUT1	0.530	0.355	0.844	0.497	0.551	0.478	0.482
	OUT2	0.521	0.366	0.845	0.504	0.535	0.455	0.492
	OUT3	0.492	0.426	0.824	0.512	0.525	0.460	0.493
	OUT4	0.507	0.260	0.773	0.453	0.549	0.545	0.451
	OUT5	0.447	0.334	0.733	0.419	0.456	0.435	0.389
Perceived Usefulness	PU1	0.486	0.438	0.521	0.891	0.489	0.533	0.469
	PU2	0.547	0.441	0.568	0.905	0.542	0.570	0.503
	PU3	0.503	0.415	0.507	0.914	0.484	0.515	0.446
	PU4	0.508	0.460	0.540	0.889	0.506	0.527	0.472
Result Demonstrability	RES1	0.535	0.344	0.555	0.488	0.906	0.546	0.510
	RES2	0.545	0.374	0.591	0.528	0.929	0.566	0.503
	RES3	0.581	0.316	0.613	0.503	0.871	0.491	0.494
Subjective Norm	SN1	0.585	0.361	0.452	0.483	0.445	0.418	0.798
	SN2	0.620	0.358	0.484	0.466	0.501	0.426	0.828
	SN3	0.545	0.356	0.494	0.381	0.445	0.396	0.832
	SN4	0.553	0.418	0.454	0.382	0.426	0.430	0.814

Table 2: T value results

Constructs	Item	Loading	Standard Error	T Value	P Value
Behavioural Intention	BI1	0.810	0.018	44.447	0.000
	BI2	0.838	0.019	44.503	0.000
	BI3	0.886	0.012	75.080	0.000
	BI4	0.883	0.011	78.773	0.000
Image	I1	0.875	0.015	57.295	0.000
	I2	0.893	0.013	67.211	0.000
	I3	0.887	0.012	75.564	0.000
	I4	0.836	0.017	50.149	0.000
	I5	0.832	0.024	34.873	0.000
Output Quality	OUT1	0.844	0.018	46.851	0.000
	OUT2	0.845	0.020	42.416	0.000
	OUT3	0.824	0.019	44.174	0.000
	OUT4	0.773	0.032	24.011	0.000
	OUT5	0.733	0.033	21.972	0.000
Perceived Usefulness	PU1	0.891	0.012	71.634	0.000
	PU2	0.905	0.011	81.375	0.000
	PU3	0.914	0.010	95.395	0.000
	PU4	0.889	0.013	67.791	0.000
Result Demonstrability	RES1	0.906	0.011	82.945	0.000
	RES2	0.929	0.008	119.672	0.000
	RES3	0.871	0.019	45.786	0.000
Subjective Norm	SN1	0.798	0.023	34.306	0.000
	SN2	0.828	0.018	46.976	0.000
	SN3	0.832	0.023	36.897	0.000
	SN4	0.814	0.022	36.639	0.000

5.2 The Convergent Validity

According to Hair *et al.*, (2010), convergent validity can be ensured through three types of estimations which are factor loadings, composite reliability (CR), and average variance extracted (AVE). Table 3 below indicated that the loading value is more than 0.50 as acceptable in the literature of multivariate analysis (Fornell & Larcker, 1981; Hair *et al.*, 2010). In this study, the result showed the composite reliability of each constructs was in the range of 0.890 to 0.944 which is well above the prescribed values. Besides that, the values of average variance extracted (AVE) ranged between 0.648 and 0.814 which indicates that there exists convergent validity.

Table 3: Convergent Validity Analysis

Constructs	Item	Loading	Cronbach alpha	Composite Reliability	AVE ^b
Behavioural Intention	BI1	0.810	0.877	0.916	0.731
	BI2	0.838			
	BI3	0.886			
	BI4	0.883			
Image	I1	0.875	0.916	0.937	0.748
	I2	0.893			
	I3	0.887			
	I4	0.836			
	I5	0.832			
Output Quality	OUT1	0.844	0.864	0.902	0.648
	OUT2	0.845			
	OUT3	0.824			
	OUT4	0.773			
	OUT5	0.733			
Perceived Usefulness	PU1	0.891	0.922	0.944	0.810
	PU2	0.905			
	PU3	0.914			
	PU4	0.889			
Result Demonstrability	RES1	0.906	0.886	0.929	0.814
	RES2	0.929			
	RES3	0.871			
Subjective Norm	SN1	0.798	0.836	0.890	0.670
	SN2	0.828			
	SN3	0.832			
	SN4	0.814			

a: Composite Reliability: $CR = (\sum \text{factor loading})^2 / \{(\sum \text{factor loading})^2 + \sum (\text{variance of error})\}$ b: Average Variance Extracted: $AVE = (\sum \text{factor loading})^2 / \{\sum (\text{factor loading})^2 + \sum \text{variance of error}\}$

5.3 The Discriminate Validity

Fornell and Larcker (1981) claimed that the square roots of AVE (average variance extracted) are used to examine the discriminant validity. Furthermore, the square root of AVE should be more than 0.50. In this study, Table 4 indicated that the diagonal elements are being considered higher than the elements in their related columns and rows. Therefore, from this results we can confirm the discriminant validity of the outer model. Discriminate validity also reveals the extent

to which items of the study are differentiated with respect to the construct. The results in the correlation matrix illustrated in Table 5 indicates that the discriminant validity is confirmed.

Table 4: The Discriminate Validity

Constructs	1)BI	2)I	3)OUT	4)PU	5)RES	6)SN
1)Behavioural Intention	0.855					
2)Image	0.388	0.865				
3)Output Quality	0.621	0.435	0.805			
4)Perceived Usefulness	0.568	0.488	0.594	0.900		
5)Result Demonstrability	0.613	0.383	0.650	0.562	0.902	
6)Subjective Norm	0.706	0.456	0.575	0.526	0.557	0.818

5.4 Predictive Relevance of the Model

In Smart PLS Software, predictive relevance of a model can be estimated by using blindfolding technique. In this study, Table 5 showed the results of prediction relevance of the model. The R² value is 58.7% of the behavioural intention, while the perceived usefulness indicate R² value (57.2%). Moreover, the results pertaining to prediction quality of the model, shows that the cross-validated redundancies for the behavioural intention (0.404), while cross validated communality value was 0.519. For the perceived usefulness, the cross-validated redundancies value was (0.432), while Cross Validated Communality value was 0.624. Moreover, Fornell and Cha (1994) claimed that if these values are more than zero, hence indicating an adequate predictive validity of the model.

Table 5: Prediction Relevance of the Model

Constructs	Variable Type	R ²	Cross-Validated Redundancy	Cross-validated Communality
BI	Endogenous	0.587	0.404	0.519
I	Endogenous	0.208	0.145	0.586
PU	Endogenous	0.572	0.432	0.624

5.5 The Hypothesis Testing

The PLS bootstrapping technique in Smart PLS 2.0 software was used to test the hypothesized model as suggested by Hair *et al.*, (2013). The analysis was to test whether the path coefficients are statistically significant or not. In this study, Table 6 shows the results of inner structural

model which consist of nine hypothesis. The results indicated that six hypotheses were supported which are H1, H2, H4, H5, H8, and H9. However, hypothesis H3, H6 and H7 are not supported.

Table 6: The Results of the Hypothesis Testing

No	Hypothesis	Path Coefficient	Standard Error (STERR)	T value	P Value	Decisions
1	PU -> BI	0.109	0.049	2.225	0.026*	Supported
2	SN -> BI	0.496	0.041	12.106	0.000***	Supported
3	SN -> PU	0.081	0.053	1.539	0.124	Not Supported
4	SN -> I	0.456	0.041	11.036	0.000***	Supported
5	I -> PU	0.170	0.051	3.317	0.001***	Supported
6	OUT -> PU	0.124	0.065	1.904	0.057	Not Supported
7	RES -> PU	0.075	0.049	1.556	0.120	Not Supported
8	PEOU -> BI	0.279	0.048	5.868	0.000***	Supported
9	PEOU -> PU	0.465	0.051	9.183	0.000***	Supported

Note: * $p < 0.05$, ** $p < 0.01$; *** $p < 0.001$

The result shows that subjective norm (SN), output quality (OUT) and result demonstrability (RES) does not have significant effect on the perceived usefulness (PU). The current findings showed that usage of m-commerce is still at infancy stage and students do not commonly practise m-commerce and consequently are not familiar with its applications. Moreover, this result is similar with previous finding such as Faqih and Jaradat (2015). Therefore, the m-commerce business must improve the quality of the system and software in mobile devices to make it more effective for users. It is important to generate greater positive users' perceptions of the usefulness of the mobile systems in future.

6.0 Discussion and Conclusions

The researchers are able to have a better understanding on a suitable model that can be used to examine the antecedents of mobile commerce adoption among university students in Malaysia based on the analysis of the previous studies and related theories used in the studied area. Besides that, the findings will help financial services such as banks to understand the behaviour and problems among youth in Malaysia to adopt mobile financial services particularly on m-banking, m-payment and m-brokering. Moreover, marketers of mobile commerce companies also gain knowledge in understanding the various key factors that might affect the behaviour intention of mobile commerce users especially mobile shopping and mobile entertainment.

Nevertheless, the current study has its own limitations. Future studies can use other samples in a wider scope as respondents to generalise the findings of the current study and could add other factors such as perceived risk and perceived trust to m-commerce adoption in future. Finally, qualitative method such as in-depth interview could be done by future research to have more understanding on consumer's perception of adoption process in m-commerce.

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