

A Study of Consumer Acceptance of Mobile Payment Services in Hong Kong

Abstract

Mobile payment (m-payment) has a significant value in business. It provides one more choice for customer in selecting the p A Secure Operational Model for Mobile Payments ayment methods. This m-payment method has been developed in Korea, Japan and China. However, m-payment is a new service and an innovative method in Hong Kong. Therefore, the aim of this study is to measure the consumer acceptance of m-payment service in Hong Kong. Technology acceptance model (TAM) was adopted in this study. Besides, additional factors have been added to the model for further exploration. As a result, the research model of this study consists of seven constructs including intention to use, attitude towards use, perceived ease of use, perceive usefulness, innovativeness, initial trust and trust propensity, and eight hypotheses are proposed to study. The empirical results of this study supports the usual relationship among attitude toward use, perceived ease of use, perceived usefulness and innovativeness, which drives the consumer intention to adopt a new technology. Six hypotheses are supported and two hypotheses had found to have no significant relationship in this study. Managerial implications in the development of m-payment were discussed and suggestions about the implementation strategy to the service provider for enhancing the Hong Kong consumers' intention to use the m-payment service were discussed as well.

Keywords: Intention to use, Attitude towards use, Perceived ease of use, Perceive usefulness, Innovativeness, Initial trust, Trust propensity and Mobile payment

1. Introduction

As the mobility has grown symbolically in today's society, telephony industry has developed significantly that the number of mobile phone accounts has risen sharply in recent years. Thus, mobile service becomes crucial part of our life (Hwang, Shiau, & Jan, 2007). Hong Kong is one of the cities with the highest penetration rate of mobile service in the world, and 16.72 million people here are using mobile service (Office of the Communication Authority, 2016).

Near Field Communications (NFC) has become a standard specification of many smartphones and this technology enables payment through a mobile application (Smart Card Alliance, 2016). Ruijun and Yao (2010) explained that NFC can transfer the data through a short-range high-frequency wireless communication technology either in active or passive modes. Thus, mobile payment ("m-payment) is enabled by NFC technology. NFC technology has already been used in Japan, South Korea and other Asian countries successfully (Ondrus & Pigneur, 2007). Recently this technology is being applied in Hong Kong. On 4th November 2016, Hong Kong Monetary Authority granted stored value facilities (SVF) licenses to 13 organizations (Hong Kong Monetary Authority, 2016) in order to satisfy the enormous demand of m-payment. According to the data from Statista (2016), the user penetration rate of m-payment in Hong Kong in the year 2016 is 13%.

Although a variety of m-payment studies are conducted in different countries, such as Korea (Shin & Lee, 2014) and Malaysia (Tan, Ooi, Chong, & Hew, 2013), there is lack of research studying NFC m-payment in Hong Kong. Thereby, the aim of this study is to measure the

acceptance of m-payment service among consumers in Hong Kong.

Technology acceptance model (TAM) (Davis, Bagozzi, & Warshaw, 1989), the popular used research model in measuring acceptance of new technology, would be adopted in this study. The field of electronic commerce is being widely explored by this model (Chau & Lai, 2003; Ho & See-To, 2010; Kuo & Yen, 2009; Zampou, Saprikis, Markos, & Vlachopoulou, 2012). TAM provides the core and general structure for constructing the model of this study including four constructs which are perceived usefulness, perceived ease of use, attitude towards use and intention to use. After the review of the literatures regarding TAM, consumer behavioral intention in m-payment with similar contexts, this study add three constructs as an extension of the TAM, including innovativeness, trust propensity and initial trust. Those constructs are expected to have influences to the consumer behavioral intention in m-payment service in Hong Kong.

2. Literature Review and Hypotheses Development

In order to study what affects users' acceptance to m-payment methods, it would be rational to adopt an already examined and well-developed model in the research. There are some famous models broadly used in investigating behavioural intention, including theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), theory of planned behavior (TPB) (Ajzen, 1991) as well as technology acceptance model (TAM) (Davis et al., 1989).

2.1 Technology Acceptance Model

Hou and Gergi (2015) specify that TAM is superior to TRA and TPB, as technology acceptance and adoption can be investigated more specifically through TAM. Moreover, TAM is the most widely adopted research model in the field related to adoption of mobile transaction services (Wei, Xinyan, & Yue, 2011). Therefore, TAM would be the most suitable model to be used in this study. Actually, there are a variety of researches adopting TAM to test the user acceptance to up-to-date technology, including SMS payment systems (Francisco, Francisco & Juan, 2015), internet banking (Hou & Gergi, 2015), business intelligence (Lindskoog & Westfeldt, 2017), m-learning (Cheng, 2015), app-based mobile tour guide (Lai, 2015), tablet PCs (Ifenthaler & Schweinbenz, 2016), e-textbooks (Ngafeeson & Sun, 2015), mobile banking apps (Muñoz-Leiva, Climent-Climent & Liébana-Cabanillas, 2017) and ERP systems (Escobar-Rodríguez & Bartual-Sopena, 2015). Among studies mentioned, different external variables are inserted into TAM so as to adapt specialties in specific fields, which allows more space for the addition of external variables based on the original TAM (Figure 1) in this m-payment study.

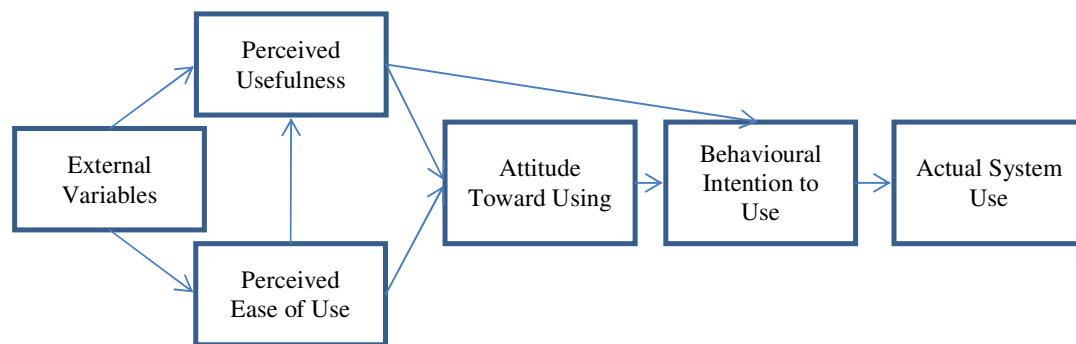


Figure 1 TAM (Davis et al., 1989)

Intention to Use and Attitude towards Use

In TAM research, the result of Davis's (1993) research indicated that attitude towards use positively affects intention to use. The result from a recent research by Hussein (2015) on e-learning provided empirical support on the positive relationship between attitude towards use and intentions to use. Meanwhile, the positive relationship is also supported in a research investigating wearable instrumented vest (Lin, Chou, Tsai, Lin, & Lee, 2016). Therefore, the first hypothesis is proposed.

Hypothesis H1: Attitude towards use has a positive effect on intentions to use.

2.2 Perceived Usefulness and Perceived Ease of Use

Davis et al. (1989) defined the perceived usefulness as the person's perceived that "using a particular system would enhance his or her job performance." and perceived ease of use is defined as the person's perceived that "using a particular system would be free of effort." Davis et al. (1989) also provided empirical evidence that both perceived usefulness and perceived ease of use has a significant and positive effect on attitude towards use.

A recent research in internet banking had consistently supported that both perceived usefulness and perceived ease of use have positive effect on behavioural intentions (Josefsson, 2017). Researchers studied the adoption of Building Information Modeling (BIM) technology in Hong Kong and their results supported that perceived ease of use affects intention to use (Lee, Wong, & Tong, 2014). Tong, Wong, and Lee (2015) also found that perceived ease of use is one of the major factors facilitating the adoption of BIM technology in Hong Kong. Based on the above studies, the following hypotheses are formed.

Hypothesis H2: Perceived usefulness has a positive effect on attitude towards use.

Hypothesis H3: Perceived ease of use has a positive effect on attitude towards use.

Hypothesis H4: Perceived ease of use has a positive effect on perceived usefulness.

2.3 Initial Trust

Initial trust is proposed as an external variable of TAM in this study. In a mobile banking research, initial trust is noteworthy that affects perceived usefulness (Zhou, 2011). Therefore, this variable is considered in this study in order to further investigate the relationship in another field, m-payment. Initial trust refers to the trust formation between people and provider relationship where people have no any credible information or no any kind of first-hand knowledge (McKnight, Choudhury, & Kacmar, 2002). The meaning of initial trust is people first encounter and within a short amount of time for the object, initial trust can be powerful and make the individual vulnerable (McKnight, Cummings, & Chervany, 1998). Thus, the following hypothesis is proposed for this study.

Hypothesis H5: Initial trust has a positive effect on perceived usefulness.

2.4 Trust Propensity

Trust propensity is another external variable proposed in this study. Zhou (2011) found that high trust propensity will more easily build initial trust in mobile banking. With the aim of testing the effect in m-payment, this variable is included in this research. Trust propensity is not equal to trust, Kee and Knox (1970) argued that trust is not depending on past experience only but also on dispositional factors such as personality. These lead the worthiness to propose the following hypothesis.

Hypothesis H6: Trust propensity has a positive effect on initial trust.

2.5 Innovativeness

Innovativeness is regarded as an external variable in this study. Actually, various researches support the positive relationship. The recent research studying TAM extension indicated that innovativeness affects both of the perceived ease of use and use intention positively (Koivisto, Makkonen, Frank, & Riekkinen, 2016). Innovativeness has also been examined as a factor influencing the use of NFC Mobile Credit Card (MCC). Tan et al. (2013) discussed that innovativeness has a significant relationship in intention to use MCC in Malaysia. In order to check whether the relationship is supported in m-payment, innovativeness is added to the research model. Innovativeness is the construct of “willingness of an individual to try out any new information technology” (Flynn & Goldsmith, 1993). Motivated and intrigued is the people’s primary nature to adopt new technologies. Innovativeness significantly measures that in order to understand personal attitudes for innovative technologies (Zarpou et al., 2012). Hence, the following hypotheses are set.

Hypothesis H7: Innovativeness has a positive effect on perceived usefulness.

Hypothesis H8: Innovativeness has a positive effect on perceived ease of use.

2.6 Research Model

After the development of hypotheses based on the literature review, a model of this study has been developed. Figure 2 identifies the framework of the proposed hypotheses among the constructs in this study. Four core and basic constructs of TAM (Davis et al., 1989) were integrated in this model, which are perceived usefulness, perceived ease of use, attitude towards use and intention to use. In addition, this model proposed that three constructs including innovativeness, trust propensity and initial trust would give influences to the consumer behavioral intention through perceived usefulness and perceived ease of use. As a result, there are eight proposed hypotheses and seven constructs in this model, which attempts to study the user acceptance of m-payment services in Hong Kong.

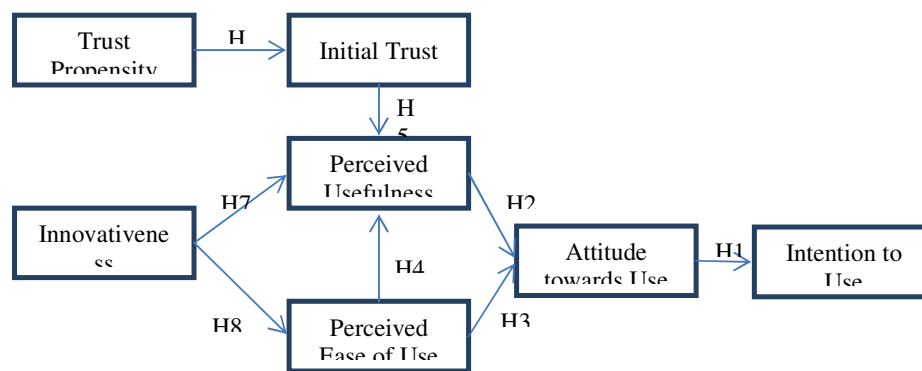


Figure 2 Research Model of this

Methodology

2.7 Sampling

People aged over 20 and the ability of using m-payment technology were surveyed by various researchers who studied in the context of mobile commerce and m-payment, their findings exhibited significant and meaningful results (Wu & Wang, 2004; Yang, Lu, Gupta, & Zhang, 2012; Schierz et al., 2010). Convenience sampling technique facilitated this study to collect the empirical data and reach this population with short period of time. Hence, convenience sampling technique was applied to this study for the respondent selection. In applying this technique, samples were obtained through distributing the paper or electronic form questionnaires to the social networks, workplaces and public association. Besides, this study invited people in person for the survey, so as to enhance the chance in collecting the valid responses.

2.8 Data Collection

300 completed questionnaires were collected in this study. However, 23 respondents gave incomplete answers to the survey or gave same rating for all items. Therefore, those 23 questionnaires were considered invalid and being eliminated from this study. As a result, a total number of valid responses was 277. In respect of the valid responses, 200 responses were obtained by completing the questionnaires in paper form through a face to face method, and 77 responses were obtained by the questionnaires in electronic format distributed through electronic communication channel such as instant messaging platform, email and social media, considering the respondents' convenience. The sample size of this study (n=277) is within the range of the usual sample size (i.e. 220 – 380) of the researches which studied in m-payment context (Ting, Yacob, Liew, & Lau, 2016; Xin, Techatassanasoontorn, & Tan, 2013).

2.9 Questionnaire Design

Based on the proposed research model by a detail review of literatures related to technology acceptance model, items of the constructs (intention to use, attitude towards use, perceived usefulness, perceived ease of use, innovativeness, initial trust and trust propensity) were adopted or adapted from the established instruments used in previous studies investigating m-payment service (Schierz, Schilke, & Wirtz, 2010; Tan et al., 2014; Zarpou et al., 2012; Yaobin, & Tao, 2007; Zhou, 2011). Among the studies mentioned, scale points applied to questionnaires vary, including 5 points and 7 points. Dawes (2012) indicated that resultant data remains comparable when 5- and 7- point scale are rescaled. Meanwhile, Finstad (2010) supported that 7-point Likert items are possible to give a more accurate measure of participants' real evaluation. As a result, a seven-point Likert-type scale was adopted in the questionnaire for answering all questions concerning the seven constructs in this study. The range of the scale is from (1) "Strongly disagree" to (7) "Strongly agree".

2.10 Measurement Items

Table 1 provides all of the measurement items and the corresponding sources for this study. Slightly modifications had been made for some wordings in few measurement items including perceived ease of use, innovativeness and initial trust. For example, the measurement items of initial trust were adapted from the research of Yaobin and Tao (2007) and their research was studied the online store. Their questionnaires were adopted because of similarity but with slightly modification had been made (i.e. the word "online store" was amended to "mobile payment") in order to make the measurement items in line with the focus of this study, as well as to keep the original meaning of the sentences.

Constructs		Measurement Items	References
Intention to Use	IU1	Given the opportunity, I will use mobile payment services	(Schierz et al., 2010)
	IU2	I am likely to use mobile payment services in the near future	
	IU3	I am willing to use mobile payment services in the near future	
	IU4	I intend to use mobile payment services when the opportunity arises	
Attitude Towards Use	ATU 1	Using mobile payment services is a good idea	(Schierz et al., 2010)
	ATU 2	Using mobile payment services is wise	
	ATU 3	Using mobile payment services is beneficial	
	ATU 4	Using mobile payment services is interesting	
Perceived Usefulness	PU1	Mobile payment services are a useful mode of payment	(Schierz et al., 2010)
	PU2	Using mobile payment services makes the handling of payments easier	
	PU3	Mobile payment services allow for a faster usage of mobile applications (e.g., ticket purchase)	
	PU4	By using mobile payment services, my choices as a consumer are improved (e.g., flexibility, speed)	
Perceived Ease of Use	PEU1	Learning to use mobile payment will be easy for me	(Tan at al., 2014)
	PEU2	Using mobile payment does not require a lot of mental efforts	
	PEU3	It would be easy for me to become skillful at using mobile payment	
	PEU4	Since mobile payment uses my mobile phone, hence a mobile phone credit card is easy to use	
Innovativeness	INN1	I am usually among the first to try m-services	(Zarmpou et al., 2012)
	INN2	I am eager to learn about new technologies	
	INN3	I am eager to try new technologies	
	INN4	My friends and neighbours often come to me for advice about new technologies and innovation	
Initial Trust	IT1	I feel that this mobile payment is reliable.	(Yaobin, & Tao,

Constructs		Measurement Items	References
	IT2	I think this mobile payment will keep its promise.	2007)
	IT3	I believe this mobile payment will use my information reasonably.	
Trust Propensity	TP1	It is easy for me to trust a person/thing.	(Zhou, 2011)
	TP2	I tend to trust a person/thing, even though I have little knowledge of it.	
	TP3	My tendency to trust a person/thing is high.	

Table 1 Measurement Items

2.11 Statistical Analysis Methods

Partial Least Squares (PLS), the structural equation modeling (SEM) technique (Bagozzi & Fornell, 1982), has been applied for analyzing the data and testing the hypotheses of this study. PLS is applicable for measuring the formative and reflective construct (Hair, Hult, Ringle & Sarstedt, 2013). Furthermore, SEM supports in studying the relationships among a model with multiple independent and dependent constructs simultaneously (Gerbing & Anderson, 1988). In view of this study, measurement of the reflective construct, multiple independent and dependent variable are required. Thus, PLS-SEM is an appropriate approach for this study and the corresponding software, Smartpls 2.0, has been used for analyzing the empirical data.

Prior to the hypotheses path testing, reliability and validity test had been performed. Regarding the reliability test, coefficient alphas (α), composite reliability (CR) and average variances extracted (AVE) had been assessed according to the recommendations from various researchers (Hair, Anderson, Tatham, & Black, 1998; Kline, 2005; Bagozzi & Yi, 1998). In respect of the validity test, this study followed the criteria set by Fornell and Larcker (1981) to evaluate the convergent and discriminant validity of the constructs of this study.

3. Results of Analysis

3.1 Sample Characteristics

Table 2 summarized the sample characteristics of the respondents. From the 277 valid responses, 143 respondents are male; 134 are female. As for the age, 59% respondents are in age 20-29. 19.6% and 10.5% respondents are in age 30-39 and 40-49 respectively. Besides, there are 8.3% and 2.5% respondents are in age 50-59 and 60 or above respectively. In terms of education level, there are 20.3% respondents are in secondary or below level. 6.9% respondents are in matriculated level and 21.7% are in non-degree tertiary level. Bachelor's degree holders are the majority (45.5%). Meanwhile, master's degree holders (5.4%) and doctor's degree holders (0.3%) also gave their responses to this study.

Profile of Survey Respondents (n=277)		
Category	Quantity	%
Gender		
Male	143	51.6%
Female	134	48.4%

Total	277	100%
Age		
20 - 29	164	59%
30 - 39	54	19.6%
40 - 49	29	10.5%
50 - 59	23	8.3%
60 or above	7	2.5%
Total	277	100%
Education level		
Secondary or below	56	20.3%
Matriculate	19	6.9%
Non-degree tertiary	60	21.7%
Bachelor's Degree	126	45.5%
Master's Degree	15	5.4%
Doctor's Degree	1	0.3%
Total	277	100%

Table 2 Characteristics of Sample

3.2 Reliability and Validity

In the first stage, coefficient alphas (α), composite reliability (CR) and average variances extracted (AVE) were calculated for assessing the scale reliability. As shown in Table 3, all coefficient alphas in this study exceed the threshold of 0.7 as recommended by Hair et al. (1998), the internal consistent has been reached. Besides, all composite reliabilities were more than 0.7 and average variances extracted were greater than the value of 0.5, those results surpass the reference thresholds as recommended by Kline (2005) and Bagozzi and Yi (1998). Each of the factor values in this study indicates a reliable measurement for the individual factors.

Constructs	AVE	CR	α
Attitude Towards Use	0.8098	0.9445	0.9216
Initial Trust	0.8557	0.9468	0.9157
Innovativeness	0.7438	0.9204	0.8842
Intention to Use	0.9188	0.9784	0.9705
Perceived Ease of Use	0.8266	0.9501	0.9298
Perceived Usefulness	0.7435	0.9204	0.8849
Trust Propensity	0.8988	0.9638	0.9437

Table 3 Reliability and Validity

3.3 Convergent and Discriminant Validity

Subsequently, the constructs validity had been evaluated by convergent and discriminant validity based on the criteria set by Fornell and Larcker (1981) and described as follows.

3.3.1 Convergent Validity Criteria

As shown in Table 4, the values of composite reliability were greater than 0.7 and the average variances extracted exceed 0.5. Furthermore, Table 5 shows that all the factor loadings were statistically significant and exceed 0.5. Those values achieved Fornell and Larcker (1981) suggested criteria. Hence, the convergent validity has been achieved.

	CR	AVE	ATU	IT	INN	IU	PEU	PU	TP
ATU	0.9445	0.8098	0.8999						
IT	0.9468	0.8557	0.6435	0.9250					
INN	0.9204	0.7438	0.6926	0.6424	0.8624				
IU	0.9784	0.9188	0.854	0.6593	0.6731	0.9585			
PEU	0.9501	0.8266	0.7125	0.5471	0.7017	0.6961	0.9092		
PU	0.9204	0.7435	0.8332	0.5733	0.647	0.7527	0.744	0.8623	
TP	0.9638	0.8988	0.4652	0.6448	0.5298	0.4302	0.406	0.4454	0.9481

NOTE: Square root of AVE on diagonal

Table 4 Convergent & Discriminant Validity

3.3.2 Discriminant Validity Criteria

Table 4 indicates that all constructs had reached the criteria of discriminant validity. According to Fornell and Larcker (1981), composite reliability should exceed 0.7 and square root of AVE must be larger than the correlation of the construct with all other constructs. Also, as shown in Table 5, the highest value of factor loading for each indicator belongs with the associated construct, achieving the last criterion from Fornell and Larcker (1981) and the validity of the empirical data had been supported.

	ATU	IT	INN	IU	PEU	PU	TP
ATU1	0.9203	-	-	-	-	-	-
ATU2	0.9018	-	-	-	-	-	-
ATU3	0.8992	-	-	-	-	-	-
ATU4	0.8778	-	-	-	-	-	-
INN1	-	-	0.8398	-	-	-	-
INN2	-	-	0.9133	-	-	-	-
INN3	-	-	0.9069	-	-	-	-
INN4	-	-	0.7831	-	-	-	-
IT1	-	0.9176	-	-	-	-	-
IT2	-	0.9258	-	-	-	-	-
IT3	-	0.9317	-	-	-	-	-

IU1	-	-	-	0.9508	-	-	-
IU2	-	-	-	0.9555	-	-	-
IU3	-	-	-	0.9723	-	-	-
IU4	-	-	-	0.9555	-	-	-
PEU1	-	-	-	-	0.8767	-	-
PEU2	-	-	-	-	0.9156	-	-
PEU3	-	-	-	-	0.9474	-	-
PEU4	-	-	-	-	0.8954	-	-
PU1	-	-	-	-	-	0.9106	-
PU2	-	-	-	-	-	0.8901	-
PU3	-	-	-	-	-	0.8413	-
PU4	-	-	-	-	-	0.8029	-
TP1	-	-	-	-	-	-	0.9393
TP2	-	-	-	-	-	-	0.9547
TP3	-	-	-	-	-	-	0.9501

Table 5 Cross Loadings

3.4 Hypotheses Path Testing

Once the appropriateness of the measurement was assessed, an empirical measure of the hypotheses effects among the constructs was examined through SmartPLS 2.0. The estimations indicate that six hypotheses were supported and two hypotheses were not supported. Figure 3 and Table 6 illustrates the standardized path coefficient (β), coefficients of determination (R^2) and t-values (t) of the latent variables.

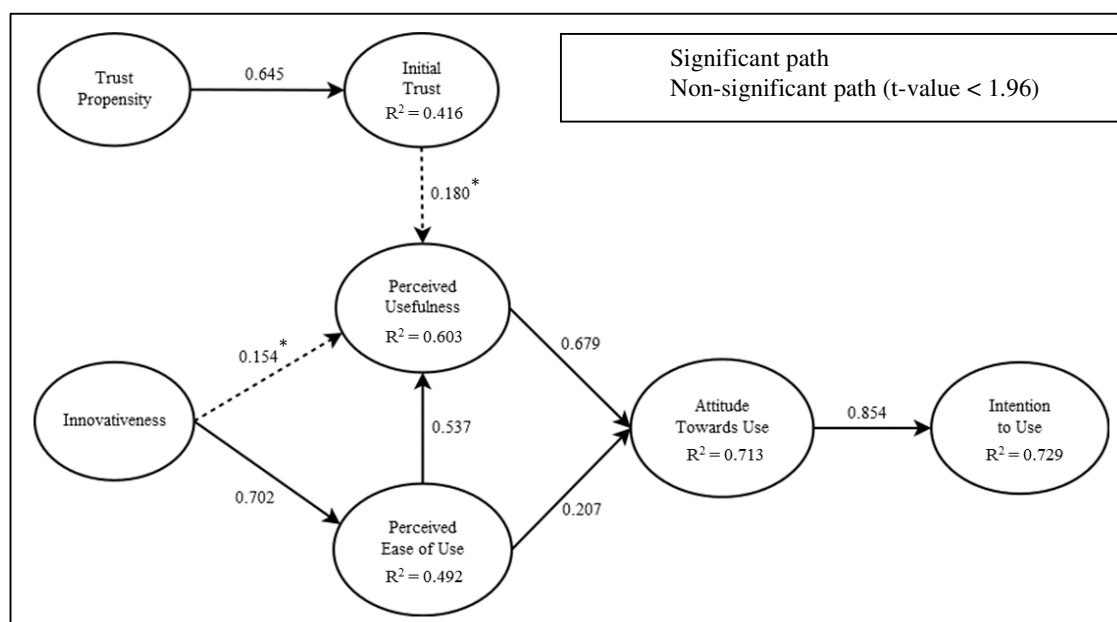


Figure 3 Results of the Model

Hypotheses	Path	Standardized Coefficient (β)	t-value (t)
H1	Attitude towards use → Intention to use	0.854	29.21
H2	Perceived usefulness → Attitude towards use	0.679	8.10
H3	Perceived ease of use → Attitude towards use	0.207	2.22
H4	Perceived ease of use → Perceived usefulness	0.537	4.42
H5	Initial trust → Perceived usefulness	0.180	1.94 #
H6	Trust propensity → Initial trust	0.645	8.44
H7	Innovativeness → Perceived usefulness	0.154	1.39 #
H8	Innovativeness → Perceived ease of use	0.702	10.80

Note: # Not Significant (t-value < 1.96)

Table 6 Path Coefficients (β) & t-value (t) of Hypotheses

As shown in Table 6, the relationship proposed in hypothesis H1 has strongly supported by the result, a statistically significant and strong positive relationship between attitude towards use and intention to use has been found ($\beta = 0.854$; $t = 29.205 > 1.96$). Moreover, results indicate that the perceived usefulness ($\beta = 0.679$; $t = 8.10 > 1.96$) and perceived ease of use ($\beta = 0.207$; $t = 2.22 > 1.96$) had statistically significant and positive relationship with attitude towards use. Thus, hypotheses H2 and H3 were supported. In addition, the relationship between perceived ease of use and perceived usefulness was statistically significant and positive as shown by the result ($\beta = 0.537$; $t = 4.42 > 1.96$). Hence, hypothesis H4 was supported.

In contrast, initial trust was found to have no significant relationship with perceived usefulness ($\beta = 0.180$; $t = 1.94 < 1.96$). Therefore, hypothesis H5 was not supported.

However, the result provides evidence that the relationship between trust propensity and initial trust was statistically significant and positive ($\beta = 0.645$; $t = 8.44 > 1.96$), supporting hypothesis H6.

On the other hand, the effect of innovativeness on perceived usefulness was not significant ($\beta = 0.154$; $t = 1.39 < 1.96$). Hence, hypothesis H7 was not supported. However, innovativeness was exerted a statistically significant and strong positive impact on perceived ease of use ($\beta = 0.702$; $t = 10.80 > 1.96$), supporting the relationship proposed in hypothesis H8.

As indicated in Figure 3, the high R^2 of perceived usefulness ($R^2 = 0.603$), attitude towards use ($R^2 = 0.713$) and intention to use ($R^2 = 0.729$) indicates that more than 60% of variances of those constructs were being explained. On the other hand, 42% variance of initial trust ($R^2 = 0.416$) and 49% variance of perceived ease of use ($R^2 = 0.492$) were being explained, such variances being explained were medium. Finally, Table 7 summarized the path relationships for each of the hypotheses for reference.

Hypotheses	Path	Results
H1	Attitude towards use $\rightarrow$ Intention to use	Supported
H2	Perceived usefulness $\rightarrow$ Attitude towards use	Supported
H3	Perceived ease of use $\rightarrow$ Attitude towards use	Supported
H4	Perceived ease of use $\rightarrow$ Perceived usefulness	Supported
H5	Initial trust $\rightarrow$ Perceived usefulness	Not Supported ($t < 1.96$)
H6	Trust propensity $\rightarrow$ Initial trust	Supported
H7	Innovativeness $\rightarrow$ Perceived usefulness	Not Supported ($t < 1.96$)
H8	Innovativeness $\rightarrow$ Perceived ease of use	Supported

Table 7 Summary of Path Relationships

4. Discussion

The relationship between trust propensity and initial trust has a significant effect, it is consistent with the argument of Zhou (2011) who described that higher trust propensity tend to more easily build up the initial trust in e-payment context.

Moreover, the result of the perceived usefulness has no significant relationship with initial trust ($t < 1.96$). It means perceived usefulness would not be influenced by the level of first-hand knowledge or reliable information in consumer perception on m-payment service.

This result is consistent with a previous research studied the online credit card and online octopus card payment system (Ho & See-To, 2010), they indicated the same relationship among perceived usefulness and initial trust. E-payment saved sensitive personal information might be one of the possible reasons to cause this result, since the knowledgeable Hong Kong people would not only rely on the market information to trust a financial tool in mature financial city.

While only perceived ease of use has a statistically significant and positive relationship with perceived usefulness ($t > 1.96$). There are many TAM researchers observed the same result, if m-payment is providing user-friendly payment process for using, individual will perceive the method as useful (Saxena, Das, & Gupta, 2005). Because traditional transaction involved several steps and it could be complicated, perceived ease of use become one of the important

concerns for most customer (Tan et al., 2014).

Contrary to the relationship we had proposed in hypothesis H7 regarding the positive effect between innovativeness and perceived usefulness, innovativeness had found to have no significant relationship with perceived usefulness. This fact seems to indicate that, although the degree of willingness of an individual to try m-payment may be high, individual will not perceive m-payment as useful. This result is contradicting to the past empirical evidence provided by Zarpou et al (2012) who studied the users' acceptance of m-payment service in Greece. However, this result is actually consistent with the findings of Kuo and Yen (2009), who studied the behavioral intention to use 3G mobile value added service in Taiwan. One possible explanation is the cultural differences between individual living in southeastern Europe and Asia.

On the other hand, innovativeness had found to have a great impact ($\beta = 0.702$) on perceived ease of use. This is in line with the findings of previous studies (Tan et al., 2013; Lu, Yao & Yu, 2005). It seems to imply that if the motivation and intrigue to use a new technology is high for an individual, an individual will tend to perceive that there is less effort required to put in learning to use the m-payment service.

Regarding the results for the core constructs: perceived usefulness, perceived ease of use, attitude towards use and intention to use m-payment service, positive and significant effects had been found among all of those constructs. This result is consistent with other researches which used the TAM model developed by Davis (1989) to study the user acceptance within the similar context, the researchers studied the information technology area including the 3G mobile value added services, internet banking, mobile services and credit card (Kuo & Yen, 2009; Chau & Lai, 2003; Zarpou et al, 2012; Ho & See-To, 2010). These results provide empirical evidence to support the use of TAM, which is significant for studying the m-payment service in Hong Kong. Besides, the consistent result indicates that m-payment is not an exception in the field of information technology. Hence, consumers are having the same attitude on the adoption of m-payment service in Hong Kong, comparing with the other services within information technology area.

Moreover, this study provides implications in practical and managerial aspect. First, initial trust seems to have no critical effect in the adoption of m-payment as it involves sensitive personal information. Therefore, steady quality for duration might be needed so as to prove the reliability and safety of m-payment service.

M-payment is a new service being developed in Hong Kong, customers might be accustomed to traditional payment method. This might be one of the possible reason to explain that perceived usefulness has no a relationship with innovativeness and initial trust. Thus, additional advantages and value added services might be needed in order to attract customer in trying the new service.

Perceived ease of use tends to be important for most customers in considering the usefulness of a new technology. Therefore, handling of payment easier, allowing for efficient usage and flexibility might be needed to put into concern while developing the m-payment service, because those factors might help in enhancing the feeling of convenience and make the m-payment to become more user-friendly and easy to use.

Finally, when marketer launched innovative service in Hong Kong market, they might need to initially target the segment with high innovativeness, since this segment perceived less difficulties in using the features and functions of an innovative product. Besides, they are highly likely to become the transmitter to influence the consumer adoption of the new service in the market.

5. Conclusion

The study had examined the consumer acceptance of mobile payment services in Hong Kong. Four constructs of TAM have been used as the core structure of the model for this study, which includes perceived usefulness, perceived ease of use, attitude towards use and intention to use. Besides, additional constructs include innovativeness, initial trust and trust propensity have been used as the extension of the model.

The analytical results of this study provide insights into the consumer behavioral intention in the adoption of m-payment service. There are six hypotheses are supported and two hypotheses has found to have no significant relationship. In addition, the statistical significant results in this study gives empirical evidence to the relationships among intention to use, attitude toward use, perceived ease of use and perceived usefulness. Hence, it supports the significance of the use of TAM for studying the m-payment service in Hong Kong.

Scholar might be inspired by this study and perform further research of TAM regarding the m-payment service in Hong Kong. Finally, this study contributes by giving significant managerial implications for the m-payment service provider in developing and polish up the service they have provided.

References

1. Ajzen, I. (1991). Theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
2. Bagozzi, R. P. and C. Fornell (1982) “Theoretical Concepts, Measurement, and Meaning,” in , vol. 2 C. Fornell (Ed.) *A Second Generation of Mulivariate Analysis: Praeger*, pp. 5-23.
3. Bagozzi, R. P., and Yi, Y. (1988) On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16, 1, 1988, 74–94.
4. Chau, P. Y., & Lai, V. S. (2003). An empirical investigation of the determinants of user acceptance of internet banking. *Journal of Organizational Computing and Electronic Commerce*, 13(2), 123–145.
5. Cheng, Y. M. (2015). Towards an understanding of the factors affecting m-learning acceptance: Roles of technological characteristics and compatibility. *Asia Pacific Management Review*, 20(3), 109-119.
6. Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340. doi:10.2307/249008
7. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). USER ACCEPTANCE OF COMPUTER TECHNOLOGY: A COMPARISON OF TWO THEORETICAL MODELS. *Management Science*, 35(8), 982-1003.
8. Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts.
9. Dawes, J. G. (2012). Do data characteristics change according to the number of scale points used? An experiment using 5 point, 7 point and 10 point scales.

- 462 10. Duane, A., O'Reilly, P., & Andreev, P. (2014). Realising M-Payments: modelling
463 consumers' willingness to M-pay using Smart Phones. *Behaviour & Information*
464 *Technology*, 33(4), 318-334.
- 465 11. Escobar-Rodríguez, T., & Bartual-Sopena, L. (2015). Impact of cultural factors on
466 attitude toward using ERP systems in public hospitals. *Revista de Contabilidad*, 18(2),
467 127-137.
- 468 12. Finstad, K. (2010). Response interpolation and scale sensitivity: Evidence against 5-
469 point scales. *Journal of Usability Studies*, 5(3), 104-110.
- 470 13. Fishbein, M., and Ajzen, I. (1975). *Belief, Attitude, Intention, and Behaviour: An*
471 *Introduction to Theory and Research*. Reading, MA: Addison-Wesley
- 472 14. Flynn, L., & Goldsmith, R. (1993). A validation of the Goldsmith and Hofacker
473 innovativeness scale. *Educational and Psychological Measurement*, 53(4), 1105-1116.
- 474 15. Fornell, C., and Larcker, D. F. (1981) Evaluating structural equation models with
475 unobservable variables and measurement error. *Journal of Marketing Research*, 18, 1,
476 1981, 39-50.
- 477 16. Francisco, L. C., Francisco, M. L., & Juan, S. F. (2015). Payment systems in new
478 electronic environments: consumer behavior in payment systems via SMS. *International*
479 *Journal of Information Technology & Decision Making*, 14(02), 421-449.
- 480 17. Gerbing, D. W. and J. C. Anderson (1988) "An Updated Paradigm for Scale
481 Development Incorporating Unidimensionality and Its Assessment," *Journal of*
482 *Marketing Research* (25) May, pp. 186-192.
- 483 18. Hair, J. F., Hult, G. T. M., Ringle, C., and Sarstedt, M. (2013) A primer on partial least
484 squares structural equation modeling (PLS-SEM). *Sage Publications*.
- 485 19. Hair, J.F. Jr., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). Multivariate data
486 analysis with reading. *Upper Saddle River, NJ: Prentice-Hall*.
- 487 20. Ho, K. K., & See-To, E. W. K. (2010). An exploratory study on the impact of trust on
488 different e-payment gateways: Octopus Card Vs. credit card.
- 489 21. Hong Kong Monetary Authority. (2016). Granting of stored value facilities licences.
490 Retrieved from
491 <http://www.hkma.gov.hk/eng/key-information/press-releases/2016/20161104-3.shtml>
- 492 22. Hou, S. K., & Gergi, G. (2015). Internet Banking Adoption in Sweden: An exploratory
493 case study of Internet banking adoption among senior citizens.
- 494 23. Hussein, Z. (2015). Explicating students' behaviours of E-learning: A viewpoint of the
495 extended technology acceptance. *International Journal of Management and Applied*
496 *Science*, 1(10), 68-73.
- 497 24. Hwang, R.-J., Shiau, S.-H., and Jan, D.-F. (2007). A new mobile payment scheme for
498 roaming services. *Electronic Commerce Research and Applications*, 6, 2, 2007, 184-191
- 499 25. Ifenthaler, D., & Schweinbenz, V. (2016). Students' Acceptance of Tablet PCs in the
500 Classroom. *Journal of Research on Technology in Education*, 48(4), 306-321.
- 501 26. Josefsson, T. (2017). Internet banking and the Technology Acceptance Model: The role
502 of trust.
- 503 27. Kee, H. W., & Knox, R. E. (1970). Conceptual and methodological considerations in the
504 study of trust and suspicion. *Journal of Conflict Resolution*, 14, 357-366.
- 505 28. Kline, R.B., (2005). Principles and Practice of Structural Equation Modeling, second ed.
506 *The Guilford Press, New York*.
- 507 29. Koivisto, K., Makkonen, M., Frank, L., & Riekkinen, J. (2016). Extending the
508 Technology Acceptance Model with Personal Innovativeness and Technology Readiness:
509 A Comparison of Three Models. *BLLED 2016: Proceedings of the 29th Bled*
510 *eConference" Digital Economy"*, ISBN 978-961-232-287-8.
- 511 30. Kuo, Y. F., & Yen, S. N. (2009). Towards an understanding of the behavioral intention to

- 512 use 3G mobile value added services. *Computers in Human Behaviour*, 25(1), 103–110.
- 513 31. Lai, I. K. (2015). Traveler acceptance of an app-based mobile tour guide. *Journal of*
514 *Hospitality & Tourism Research*, 39(3), 401-432.
- 515 32. Lee, W., Wong, A., & Tong, C. (2014). A Qualitative study of the software Adoption of
516 Building Information Modelling Technology in the Hong Kong Construction Industry.
517 *Business and Economic Research* Vol 4(2).
- 518 33. Lin, W. Y., Chou, W. C., Tsai, T. H., Lin, C. C., & Lee, M. Y. (2016). Development of a
519 Wearable Instrumented Vest for Posture Monitoring and System Usability Verification
520 Based on the Technology Acceptance Model. *Sensors*, 16(12), 2172.
- 521 34. Lindskoog, P., & Westfeldt, J. (2017). Drilling down into Business Intelligence: A study
522 of implementation obstacles.
- 523 35. Lu, J., Yao, J. E., & Yu, C. S. (2005). Personal innovativeness, social influences and
524 adoption of wireless Internet services via mobile technology. *The Journal of Strategic*
525 *Information Systems*, 14(3), 245-268.
- 526 36. McKnight, D. H., Choudhury, V. & Kacmar, C., (2002). Developing and validating trust
527 Measures for e-commerce: an integrative typology. *Information Systems Research*, 13(3),
528 334-59.
- 529 37. McKnight, D.H., Cummings, L.L., & Chervany, N.L. (1998). Initial trust formation in
530 new organizational relationships. *Academy of Management Review* 23 (3), 473–490.
- 531 38. Muñoz-Leiva, F., Climent-Climent, S., & Liébana-Cabanillas, F. (2017). Determinants of
532 intention to use the mobile banking apps: An extension of the classic TAM model.
533 *Spanish Journal of Marketing-ESIC*.
- 534 39. Nasri, W., & Charfeddine, L. (2012). Factors affecting the adoption of Internet banking
535 in Tunisia: An integration theory of acceptance model and theory of planned
536 behavior. *The Journal of High Technology Management Research*, 23(1), 1-14.
- 537 40. Ngafeeson, M. N., & Sun, J. (2015). The Effects of Technology Innovativeness and
538 System Exposure on Student Acceptance of E-textbooks. *Journal of Information*
539 *Technology Education: Research*, 14.
- 540 41. Nunally, J. C. (1978). *Psychometric Theory*, 2nd.
- 541 42. Office of the Communication Authority. (2016). *Telecommunications*. Retrieved from
542 <http://www.gov.hk/en/about/aboutthk/factsheets/docs/telecommunications.pdf>
- 543 43. Ondrus, J., & Pigneur, Y. (2007). An assessment of NFC for future mobile payment
544 systems. In *Management of Mobile Business*, 2007. ICMB 2007. International
545 Conference on the (pp. 43-43). IEEE.
- 546 44. Ruijun, G., Yao, J., (2010). Comparison and tendency of main mobile payment
547 technologies in China. In: *International Conference on Future Information Technology*
548 *and Management Engineering*, IEEE, pp. 434–437.
- 549 45. Saxena, A., Das, M.L., Gupta, A., (2005). MMPS: a versatile mobile-to-mobile payment
550 system. In: *Proceedings of the International Conference on Mobile Business (ICMB)*,
551 IEEE, Australia, pp. 400–405.
- 552 46. Schierz, P. G., Schilke, O., & Wirtz, B. W. (2010). Understanding consumer acceptance
553 of mobile payment services: An empirical analysis. *Electronic commerce research and*
554 *applications*, 9(3), 209-216.
- 555 47. Shin, S. & Lee, W. (2014). The Effects Of Technology Readiness And Technology
556 Acceptance On NFC Mobile Payment Services In Korea. *The Journal of Applied*
557 *Business Research*, 30(6). 1615-1626
- 558 48. Smart Card Alliance. (2016). NFC Resources. Retrieved from
559 <http://www.smartcardalliance.org/smart-cards-applications-nfc/>.
- 560 49. Statista. (2016). The Statistics Portal. Retrieved from
561 <https://www.statista.com/outlook/331/118/mobile-payments/hong-kong#takeaway>

- 562 50. Tan, G. W. H., Ooi, K. B., Chong, S. C., & Hew, T. S. (2014). NFC mobile credit card:
563 the next frontier of mobile payment?. *Telematics and Informatics*, 31(2), 292-307.
- 564 51. Ting, H., Yacob, Y., Liew, L., & Lau, W. M. (2016). Intention to Use Mobile Payment
565 System: A Case of Developing Market by Ethnicity. *Procedia-Social and Behavioral*
566 *Sciences*, 224, 368-375.
- 567 52. Tong, C., Wong, A., & Lee, W. (2015). Barriers to Software Adoption: A Study of
568 Building Information Modelling (BIM) Technology in the Hong Kong Construction
569 Industry. *International Journal of Advanced Multidisciplinary Research* 2(4).
- 570 53. Wei, G., Xinyan, Z., & Yue, M. (2011). Literature review on consumer adoption
571 behavior of mobile commerce services. In *2011 International conference on e-business*
572 *and e-government (ICEE)* (pp.1-5). New York: IEEE.
- 573 54. Wu, J. H., & Wang, S. C. (2005). What drives mobile commerce?: An empirical
574 evaluation of the revised technology acceptance model. *Information &*
575 *management*, 42(5), 719-729.
- 576 55. Xin, H., Techatassanasoontorn, A. A., & Tan, F. B. (2013). Exploring the influence of
577 trust on mobile payment adoption.
- 578 56. Yang, S., Lu, Y., Gupta, S., Cao, Y., & Zhang, R. (2012). Mobile payment
579 services adoption across time: An empirical study of the effects of behavioral beliefs,
580 social influences, and personal traits. *Computers in Human Behavior*, 28(1), 129-142.
- 581 57. Yaobin, L., & Tao, Z. (2007). A research of consumers' initial trust in online stores in
582 China. *Journal of research and practice in information technology*, 39(3), 167-180.
- 583 58. Zarpou, T., Saprikis, V., Markos, A., & Vlachopoulou, M. (2012). Modeling
584 users' acceptance of mobile services. *Electronic Commerce Research*, 12(2), 225-248.
- 585 59. Zhou, T. (2011). An empirical examination of initial trust in mobile banking. *School of*
586 *Management* 21(5), 527-540.