

## Mobile Commerce for Retail Market in Thailand

Pornprom Suthatorn

Graduate School, Dusit Thani College, Bangkok, Thailand

Email: pornprom.su@dtc.ac.th

### การค้าโมบายล์สำหรับตลาดค้าปลีกในประเทศไทย

พรพรหม สุธาทร

บัณฑิตวิทยาลัย วิทยาลัยดุสิตธานี กรุงเทพมหานคร ประเทศไทย

อีเมล: pornprom.su@dtc.ac.th

#### Abstract

This research studied the adoption of mobile commerce (M-commerce) for Thai retail customers in Bangkok, Thailand. The author used the theory of planned behavior (TPB) to investigate the perception of the adoption of mobile commerce in the retail market by investigating the relationships among (1) the level of *attitude* toward the behavior, (2) *the subjective norm*, (3) *the perceived behavioral control* of Thai retail customers when they consider the mobile commerce channel and (4) the degree of their *adoption* of mobile commerce in the retail market. The theory also suggested that those four variables will create the intention of customers to use their mobile to purchase their retail products. One hundred and twenty questionnaires were collected from people in Bangkok on a voluntary basis. The results from an ordinary *least squares* regression analysis showed that intention mediated the linkage between *attitude* toward the *behavior* and *subjective norm* and strengthened the *adoption* of mobile commerce.

**Keywords:** Mobile commerce, m-commerce, retail market, theory of planned behavior, TPB

#### บทคัดย่อ

วิจัยนี้ศึกษาการนำการค้าโมบายล์มาใช้กับลูกค้าปลีกชาวไทยในกรุงเทพฯ ประเทศไทย ผู้เขียนได้ใช้ทฤษฎีการวางแผนพฤติกรรม (TPB) เพื่อให้เข้าใจมุมมองของการใช้การค้าโมบายล์ในตลาดค้าปลีก โดยได้ศึกษาลงไปรายละเอียดของความสัมพันธ์ระหว่าง (1) ระดับทัศนคติที่มีต่อพฤติกรรม (2) เกณฑ์มาตรฐานที่กำหนดโดยความคิดเห็น และ (3) การควบคุมพฤติกรรมที่สามารถเข้าใจได้ ของลูกค้าปลีกชาวไทย เมื่อพิจารณาการใช้ช่องทางของการค้าโมบายล์ และ (4) ระดับมากน้อยของการนำการค้าโมบายล์ไปใช้ในตลาดค้าปลีก ทฤษฎีที่ใช้ในงานวิจัยชี้ให้เห็นว่า มีสิ่งองค์ประกอบที่จะสร้างให้เกิดความตั้งใจของลูกค้าในการนำเอาโมบายล์ไปซื้อสินค้าประเภทค้าปลีก ผู้วิจัยได้ใช้แบบสอบถาม 120 ชุด ในการเก็บข้อมูลจากประชาชนในกรุงเทพฯ โดยที่ผู้ให้ข้อมูลมีความสมัครใจในการตอบแบบสอบถาม ผลจากการวิเคราะห์ข้อมูล

โดยใช้สถิติวิเคราะห์เชิงถดถอย Ordinary Least Squares Regression Analysis แสดงให้เห็นว่า ความตั้งใจของลูกค้าในการใช้การชำระเงินเกิดจากความเชื่อมโยงระหว่าง *ทัศนคติที่มีต่อพฤติกรรมและเกณฑ์มาตรฐานที่กำหนดโดยความคิดเห็น* ซึ่งทำให้มีกำลังเสริมให้ใช้การชำระเงิน

**คำสำคัญ:** การชำระเงิน, ตัวอย่การชำระเงิน (m-commerce), ทฤษฎีการวางแผนพฤติกรรม, TPB

## 1. Introduction

Thailand has been recognized for its largest number of mobile internet users in South East Asia, particularly social media via Facebook, Line, YouTube and Game applications. These programs also offer an in-app-purchase and online purchase for additional storage, advertisements and other special items of preference—all as part of Mobile commerce (M-commerce). Since the first M-commerce server was invented by Kevin Duffey (1997), which was the winner of “Most Innovative Mobile Product” by Financial Times. Many more companies in various markets turned to the mobile commerce sector every year. Starting from Coca-Cola’s vending machine in Helsinki, Finland that accepted the payment via SMS mobile message in 1997 to today’s mobile commerce market having sales on mobile. In South Korea, customers started buying retail products via QR code on advertisement in subway stations and paying monthly bills on mobile phone.

Such an online purchase trend has also been the case with customers in Thailand in buying retail products. The first category of products sold on mobile or Internet in Thailand was the electronic device, such as a mobile phones, laptop computers and cameras. Nielsen e-Commerce Landscape Report (2018) pointed to an increase in retail online shopping of Thai consumers in the past two years and its continued growth. Thailand's retail market has been the largest market share of its GDP and showed a strong growth annually. The researcher of this study therefore would like to study the adoption of Bangkok people in consuming retail products via mobile purchasing in four aspects:(1) the level of *attitude* toward the behavior, (2) *subjective norm*, (3) perceived *behavioral* control of Thai retail customers when they consider the mobile commerce channel and (4) the degree of their *adoption* of mobile commerce in the retail market. It was expected that major findings in this research can help retail marketers foresee the mobile purchase trend for proper adjustments in retail business.

## 2. Literature Review:

### 2.1 M-Commerce

After the Internet has connected millions of devices together, the marketplace is not restricted only in places but also on the Internet or in the virtual market. People have access to information of products they are interested in and their purchasing transactions can be done online via mobile devices in the context of electronic commerce (E-commerce) or mobile commerce (M-commerce). Companies or suppliers can reach more end users, and as a result, M-commerce has gained more market share and shown a constant growth into the future (Insa-Ciriza, 2001). It should be noted that the adoption of

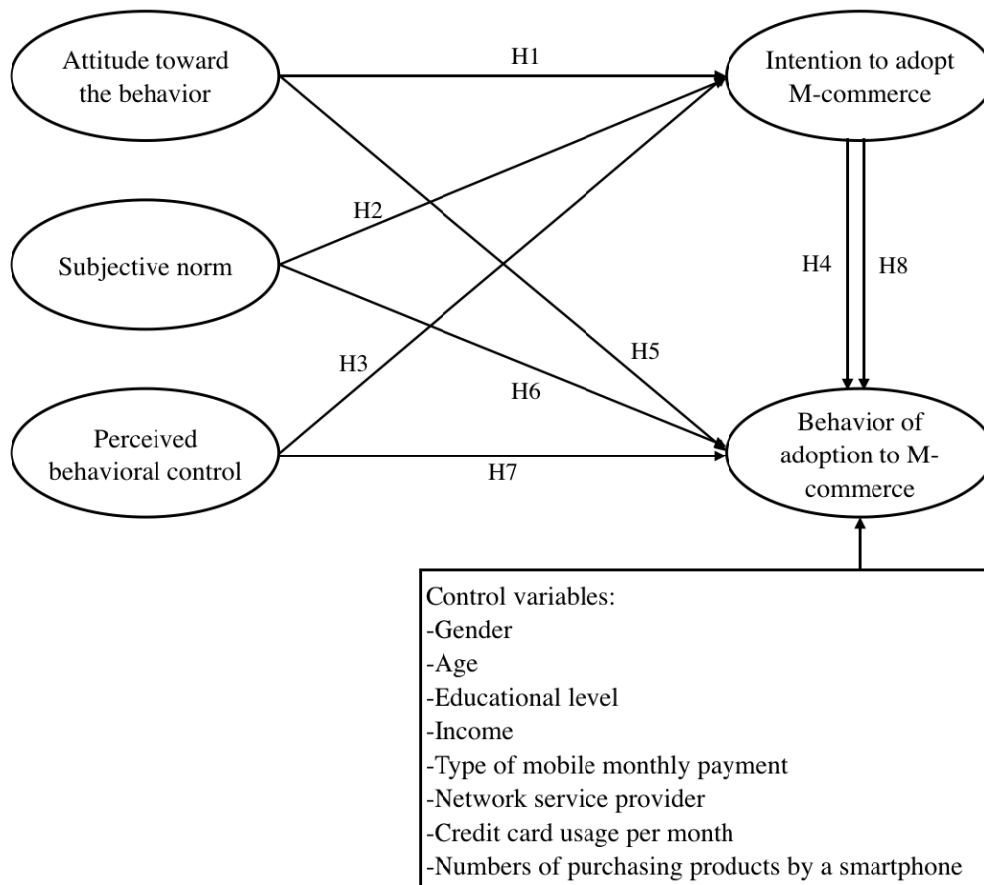
m-commerce has been accelerated with better Internet connection, security, reliability (Kini, 2009). The transformation from E-commerce to M-commerce with website interface has accounted for its reliability and persuasive features (Marci & Steve, 2009).

## **2.2 Consumer and Retail Market**

The retail market was reported at 15.4% of Thailand GDP in 2018 (Nielsen e-Commerce Landscape Report, 2018; World Bank Group: Thailand at Glance, 2018). It was the second highest market share of GDP after the manufacturing sector. There tail market growth has been on the rise every year and less affected by unstable circumstances. Shannon (2005) stated that there has been a fast growing of retail modern trade in Thailand. Some of Thai local investors bought specific retail chains from foreign owners. For example, Tops Supermarket, owned by Central Group, was bought from Ahold Group in 2004, and one of Jusco supermarkets from the Japanese chain owner. These buying situations indicated the rapid growth of the retail sector in Thailand. The Thai government has tried to regulate the expansion of chain retail shops. But the retailers adjusted their strategy by opening small shops in each shopping area to get by the hypermarket law. Such an avoidance strategy can be no longer necessary as soon as M-commerce comes on the scene. With M-commerce in the retail market, retailers can reach more retail customers without breaking the hypermarket law. In contrast to 2002, Rupton reported the market share of retail market in E-commerce at only 19% showing young internet users experiencing online purchasing at that time.

## **2.3 Theory of Planned Behavior (TPB)**

In this study, the researcher used the Theory of Planned Behavior (TPB) by Ajzen, (1991) to study the adoption of M-commerce in Thailand. This model was applied to many sectors such as E-commerce usage (Bhattacharjee, 2000) to the green consumption (Sparks & Shepherd, 1992). The model indicates three factors that lead to the intention of adoption: (1) the attitude toward behavior, (2) the subjective norm, and (3) the perceived behavioral control. The relationship can be identified as the level of strength among these factors affecting the intention of adoption of M-commerce. The conceptual model is shown in Figure1.



**Figure 1:** Conceptual Model

Mishra (2014) applied this model in India to find the relation among these three factors to intention in adopting of m-commerce. Mishra (2014) stated that he believes that the relation among attitude toward the behavior, subjective norms and perceived behavioral control should have a positive and significant effect on intention of adoption in M-commerce. However, the subjective norm was found not significant in relation to the intention of adoption.

Khalifa & Chen (2008) conducted their research in Hong Kong using the theory of planned behavior to find out why the adoption of M-commerce though with a high use of mobile phone. They found *attitude* and the *subjective norm* significantly positive but not the perceived behavioral control. The researchers concluded that the intention to adopt M-commerce stemmed from attitude and the norms of society and especially an extended factor called *perceived behavioral consequence* containing some control variable inside, such as privacy of using, efficiency, cost and security.

Abbad (2013) studied the use TPB but in the sector of E-banking in Jordan. The researcher reported the subjective norm having a positive and significant impact on the adoption of E-banking. Other factors extended from the theory were included, such as Internet experiences, enjoyment, security and trust.

Those are empirical studies reporting the use of TPB in M-commerce. In Thailand, however, the researcher tried in this study the use original TPB

(Ajzen, 2002), without adding any extended factors, to find the result of intention of adoption on M-commerce.

### **3. Hypotheses:**

#### **3.1 Attitude toward the Behavior and Intention to Adopt M-commerce**

To Mishra (2014), the *attitude* toward behavior is favorableness and unfavorableness to the result in consequence of the behavior conducted. M-commerce is defined as a transaction of trading online that has an issue of security concerned but provides convenience for this type of purchasing. Customers have time to compare specifications or reviews from others for a right decision. M-commerce products usually come with a delivery service. This service suits people's lifestyle in cities today.

Hypothesis 1 (H1): Attitude toward M-commerce will have positive and significant effect on people's intention to adopt M-commerce.

#### **3.2 Subjective Norm and Intention to Adopt M-commerce**

To Ajzen (1991), the *subjective norm* is how people approve or disapprove behavior of a person. The transaction online is attractive to younger customers with experience in purchasing online. In Thailand's context, the young group may not have much influence on the older members in their family. The subjective norm in Thailand might have a significant influence over people's behavior in purchasing online.

Hypothesis 2 (H2): The subjective norm will have positive and significant effect on people's intention to adopt M-commerce.

#### **3.3 Perceived Behavioral Control and Intention to Adopt M-commerce**

According to Ajzen (1991), the *perceived behavioral control* is the ease or difficulty to perform a behavior they prefer. It deals with resources like time and money. The more resource they have, the more perceived behavioral control they reveal. From this information, the researcher formed Hypothesis 3.

Hypothesis 3 (H3): The perceived behavioral control will have positive and significant effect on people's intention to adopt M-commerce.

#### **3.4 Intention to Adopt M-commerce and Behavior of Adoption to M-commerce**

Ajzen (1991) showed his diagram with the intention of using M-commerce coming from three factors that have impact on the intention, that is, the attitude toward the behavior, the subjective norm and the perceived behavioral control. The first three hypotheses lead to the last hypothesis.

Hypothesis 4 (H4): Intention of individual usage of M-commerce will have positive and significant effect on people's adoption of M-commerce.

#### **3.5 Mediating Effect Testing toward TPB Model in M-commerce**

The theory of planned behavior proposed a model that *three concepts* (attitude, subjective norm, perceived behavioral control) have their effect through *intention* leading to *behavior*. This model suggests a full mediation model. There is a need for a hypothesis to test whether there is any relation among the three concepts to the behavioral concept. The researcher used the Sobel theory to test Hypotheses 5-8.

Hypothesis 5 (H5): Attitude toward M-commerce will have no significant effect on people's adoption of M-commerce.

Hypothesis 6 (H6): The subjective norm toward M-commerce will have no significant effect on people's adoption of M-commerce.

Hypothesis 7 (H7): The perceived behavioral control toward M-commerce will have no significant effect on people's adoption of M-commerce.

Hypothesis 8 (H8): Intention of Individual usage of M-commerce toward M-commerce will have positive and significant effect on people's adoption of M-commerce.

#### 4. Methodology:

##### 4.1 The Subjects

The subjects in this study were 120 mobile phone users in Bangkok (Male=48 (40%) and Female=72 (60%). They responded to the questionnaire distributed to them. The questionnaire asks for information on demographic variables and online purchasing behavior, such as type of mobile payment, number of online purchases per month, number of times of credit card use per month, and network service provider. The subjects' data are shown in Table 1 below.

**Table 1:** Demographic Variables and Online Purchasing Behavior

Gender	Male: 48 (40%) Female: 72 (60%)
Age (in years)	Below 20: 6 (5%) 21-30: 81 (67.5%) 31-40: 27 (22.5%) 41-50: 6 (5%) 51-60: 0 (0%) Above 60: 0 (0%)
Educational level	Below Bachelor's degree: 0 (0%) Bachelor's degree: 54 (45%) Master's degree: 60 (50%) Doctoral degree: 6 (5%)
Income (baht)	Below 10,000: 9 (7.5%) 10,001-20,000: 15 (12.5%) 20,001-30,000: 42 (35%) 30,001-40,000: 21 (17.5%) 40,001-50,000: 9 (7.5%) Above 50,000: 24 (20%)
Types of mobile's monthly payment	Prepaid: 30 (25%) Postpaid: 90 (75%)

Network service providers	AIS: 45 (37.5%) DTAC: 24 (20%) TRUEMOVEH: 51 (42.5%) Others: 0 (0%)
Credit card use per month	0 time: 33 (27.5%) 1-5 times: 39 (32.5%) 6-10 times: 36 (15%) Above 10 times: 30 (25%)
Frequency of purchasing products by a smart phone	time: 63 (52.5%) 2-3 times: 45 (37.5%) 4-5 times: 9 (7.5%) Above 5 times: 3 (2.5%)

#### 4.2 Questionnaire development

The researcher used the questionnaire on the scale of 1 (*strongly disagree*) to 5 (*strongly agree*) (see the Appendix) used by the preceding researchers (Meadows, 2003; Bulmer, Gibbs & Hyman, 2006) for the established validity and reliability of the questionnaire and for result comparison based on the same scale. It should be noted that the researcher used a Thai-English bilingual translator to ensure the questionnaire's validity in the translated version in Thai (Brislin, 1970).

#### 4.3 The Questionnaire

The researcher used the questionnaire from the Theory of Planned Behavior Questionnaire by Ajzen (1991). Some questions were slightly modified to suit to Thailand's M-commerce context. The questionnaire covers five concepts in three independent variables (Attitude, Subjective norm, Perceived behavioral control), one mediating variable (Intention) and one dependent variable (Behavior). Each concept is measured by five questions except the behavior concept that carries 3 questions (see the Appendix).

All questions on each concept are on the scale of 1 *strongly disagree* to 5 *strongly agree* (as shown in the Appendix).

- The attitude concept deals with perception about M-commerce. Do they feel favorable or positive about purchasing online by smart phone?
- The subjective norm concept asks how they are affected by people who are closed or related to them.
- The perceived behavioral control concept taps how they control themselves not to be persuaded to purchase by smart phone.
- The intention concept inquires their intention to use M-commerce to purchase products online.
- The behavioral concept checks their experiences in purchasing products by smart phone.

## 5. Data Analysis

The researcher used the statistical package SPSS version 24. The reliability analysis was to check the data reliability, followed by the factor analysis to check the weight of each question. The correlation technique showed how the concepts relate to each other. The researcher also used the ordinal least square (OLS) regression to analyze and predict the data.

## 6. Results:

### 6.1 Reliability Analysis

The researcher used Cronbach's alpha to test reliability of the findings. The expected result is the value over the acceptable range or above 0.6 (Nunnally, 1978). The result of reliability of the questions is shown below.

**Table 2:** Cronbach's Alpha of Each Set of Questions

The concepts' findings	Cronbach's alpha
Attitude	0.814
Subjective norms	0.663
Perceived behavioral control	0.688
Intention	0.867
Behavior	0.833

The findings on *Attitude*, *Intention* and *Behavior* have their value over the good range or above 0.7 and the value from *Subjective Norm* and *Perceived Behavioral Control* is over 0.6. These results indicate that the findings from these questions have reliability over an acceptable range.

### 6.2 Exploratory Factor Analysis (EFA)

The exploratory factor analysis shows the weight of each factor on the target concept. The result of Kaiser-Meyer-Olkin (KMO) value is 0.662, which is above the threshold. This study used the component matrix table to interpret the results with a better value. The *attitude* concept has 5 questions. Four of five questions have value above 0.5. The *subjective norm* concept has 5 questions. Two of five questions have value above 0.5.

The *perceived behavioral control* concept has 5 questions. Three of five questions have value above 0.5. The *intention* concept has 5 questions. All five questions have value above 0.5. The *behavioral* concept has 3 questions. All three questions have value above 0.5.

The expected Kaiser-Meyer-Olkin (KMO) value is above 0.5 to represent adequacy of the sample of which the value has to exceed the threshold.

The method of rotation is Varimax extraction of 5 factors. The model has 5 concepts extracted but the first component appears to have 3 concepts in it. The results are shown in Table 3.



**Table 3:** Exploratory Factor Analysis (EFA) Result

Questions & Concepts	Components				
	1	2	3	4	5
<b>Attitude</b>					
ATT1	<b>.835</b>	.179	-.032	-.064	-.173
ATT2	<b>.613</b>	.114	-.469	-.074	-.013
ATT3	<b>.654</b>	.121	-.372	.351	.289
ATT4	<b>.490</b>	.547	.224	-.177	-.259
ATT5	<b>.692</b>	.250	-.316	.359	.112
<b>Subjective Norm</b>					
NORM1	.277	-.480	<b>.710</b>	-.166	.057
NORM2	.331	-.463	<b>.706</b>	-.044	.045
NORM3	.424	-.523	<b>.283</b>	.442	.173
NORM4	.233	.630	<b>.088</b>	.181	-.416
NORM5	.288	-.610	<b>.107</b>	.453	.189
<b>Perceived Behavioral Control</b>					
BCTRL1	.289	<b>.675</b>	.135	.077	.480
BCTRL2	.234	<b>.585</b>	.361	.446	.165
BCTRL3	.255	<b>.662</b>	.398	-.062	.074
BCTRL4	-.206	<b>.171</b>	.170	-.271	.552
BCTRL5	.436	<b>.212</b>	.490	.155	-.105
<b>Intention</b>					
INTEN1	<b>.856</b>	.058	.044	-.308	-.018
INTEN2	<b>.856</b>	.054	.084	-.245	-.027
INTEN3	<b>.610</b>	-.316	.091	.131	-.409
INTEN4	<b>.698</b>	-.030	.144	-.310	-.022
INTEN5	<b>.806</b>	-.122	-.131	.275	-.104
<b>Behavior</b>					
BHAV1	<b>.761</b>	-.380	-.294	-.214	.117
BHAV2	<b>.569</b>	-.012	-.124	-.357	.352
BHAV3	<b>.771</b>	-.322	-.263	-.095	.017
<b>Total Variance Explained</b>	<b>33.17%</b>	<b>15.60%</b>	<b>10.49%</b>	<b>6.90%</b>	<b>5.79%</b>

Note: KMO: 0.662, Bartlett's Test df: 253, p-value: 0.0001

### 6.3 The Correlation

In testing the relationship among variables, the researcher used a bivariate correlation method to find the correlation coefficient ( $r$ ) and the p-value of each concept and how they relate to the others. Table 4 shows the Pearson's correlation value.

**Table 4:** Pearson's Correlation

	ATT	NORM	BCTRL	INTEN	BHAV
<b>Attitude</b>	1	0.151	0.354*	0.729**	0.593**
<b>Subjective norm</b>		1	0.69	0.452**	0.321*
<b>Perceived behavioral control</b>			1	0.22	-0.006
<b>Intention</b>				1	0.7**
<b>Behavior</b>					1

Note: \* means correlation is significant at the 0.05 level (2-tailed)

\*\* means correlation is significant at the 0.01 level (2-tailed)

The p-value is the value to determine the relationship among concepts. Table 4 shows the results of Pearson's correlation value which has '1' as the relation of itself. From the result, the *attitude* concept has a positive relation to the *perceived behavioral control* significantly at the 0.05 level, and *intention* and the *behavior* significantly at 0.01 level. The *subjective norm* concept has a positive relation to *intention* at the 0.01 level, and the *behavioral* concept significantly at the 0.05 level. The *intention* concept has a positive relation to the *behavioral* concept significantly at the 0.01 level.

### 6.4 The Regression Analysis

The researcher used the Ordinal Least Square (OLS) regression to analyze the obtained data, and tried a linear regression method to confirm the hypotheses. Hypotheses 1-4 were to confirm the TPB theory. As shown, three concepts--Attitude, Subjective norm and Perceived behavioral control--are mediating through the *intention* concept for its effect on the *behavior*. Hypotheses 5-7 were created to confirm the mediation of this model by testing the direct effect among three models (Attitude, Subjective norm and Perceived behavioral control) and the behavioral concept. Table 5 reports the results.

**Table 5:** The OLS Regression Results

Independent Variables	Dependent Variables		
	Hypotheses 1-3	Hypothesis 4	Hypotheses 5-8
	Intention	Behavior	Behavior
<b>Attitude</b>	0.814*** (Std error 0.166)	-	0.480 (Std error 0.351)
<b>Subjective norm</b>	0.344** (Std error 0.147)	-	0.136 (Std error 0.248)
<b>Perceived behavioral control</b>	-0.082 (Std error 0.179)	-	-0.301 (Std error 0.276)
<b>Intention</b>	-	0.990*** (Std error 0.190)	0.712* (Std error 0.296)
<b>Behavior</b>	-	-	-
<b>Gender</b>	0.123	0.097	0.200
<b>Age</b>	-0.017	-0.308	-0.293
<b>Educational level</b>	0.046	-0.110	-0.064
<b>Income</b>	0.410	0.008	-0.007
<b>Credit card use per month</b>	-0.044	0.279	0.296
<b>Purchased online per month</b>	0.011	0.231	0.117
<b>Mobile payment type</b>	0.181	-0.022	-0.071
<b>Mobile network: AIS</b>	-0.564	-0.497	-0.550
<b>Mobile network: DTAC</b>	0.132	0.214	0.224
<b>Mobile network: TRUE</b>	0.045	-0.209	-0.163

Unstandardized coefficients of the obtained data were reported.

Notes: \* significant at 0.05 level,

\*\* significant at 0.01 level.

\*\*\* significant at 0.001 level.

## 6.5 Dependent Variable: Intention to Adopt M-commerce

### Hypotheses 1-3

From Hypothesis 1, the attitude concept was expected to have a positive and significant effect on people's intention to adopt M-commerce. Table 5 shows *intention* as a dependent variable affected by the *attitude* concept with a positive and significant result ( $\beta = 0.814$ ,  $p = 0.001$ ). Hypothesis 1 is therefore supported.

From Hypothesis 2, the *subjective norm* concept was expected to have a positive and significant effect on people's intention to adopt M-commerce. Table 5 shows *intention* as a dependent variable affected by the *subjective norm* concept with a positive and significant result ( $\beta = 0.344$ ,  $p = 0.01$ ). Hypothesis 2 is therefore supported.

From Hypothesis 3, the *perceived behavioral control* concept was expected to have a positive and significant effect on people's intention to adopt M-commerce. Table 5 shows *intention* as a dependent variable not affected by the *perceived behavioral control* concept with a negative and not significant result ( $\beta = -0.082$ ,  $p = 0.690$ ). Hypothesis 3 therefore is not supported.

The regression model (Hypotheses 1-3) can explain about 68.1% (R square = 0.681) of people's intention to adopt M-commerce. And there are no control variables that have a significant effect on this relation.

## **6.6 Dependent Variable: Behavior of Adoption to M-commerce**

### **Hypothesis 4**

From Hypothesis 4, the intention concept was expected to have a positive and significant effect on people's adoption to M-commerce. Table 5 shows behavior as a dependent variable affected by the intention concept with a positive and significant result ( $\beta = 0.990$ ,  $p = 0.001$ ). Hypothesis 4 is therefore supported.

This regression model (Hypothesis 4) can explain about 64.5% (R square= 0.645) of people's intention to adopt M-commerce. And there are no control variables that have a significant effect on this relation.

## **6.7 Dependent variable: Behavior of adoption to M-commerce**

### **Hypothesis 5-8**

From Hypothesis 5, the attitude concept was expected to have no significant effect on people's adoption to M-commerce. Table 5 shows behavior as a dependent variable affected by the attitude concept with a positive and significant result ( $\beta = 0.480$ ,  $p = 0.183$ ). Hypothesis 5 is therefore supported.

From Hypothesis 6, the subjective norm concept was expected to have no significant effect on people's adoption to M-commerce. Table 5 shows behavior as a dependent variable affected by the subjective norm concept with a positive and significant result ( $\beta = 0.136$ ,  $p = 0.588$ ). Hypothesis 6 is therefore supported.

From Hypothesis 7, the perceived behavioral control concept was expected to have no significant effect on people's adoption to M-commerce. Table 5 shows behavior as a dependent variable affected by the perceived behavioral control concept with a positive and significant result ( $\beta = -0.301$ ,  $p = 0.286$ ). Hypothesis 7 is therefore supported.

From Hypothesis 8, the intention concept was expected to have positive and significant effect on people's adoption to M-commerce. Table 5 shows behavior as a dependent variable affected by the intention concept with a positive and significant result ( $\beta = 0.712$ ,  $p = 0.024$ ). Hypothesis 8 is therefore supported.

This regression model (Hypotheses 5-8) can explain about 69.1% (R square= 0.691) of people's intention to adopt M-commerce. And there are no control variables that have a significant effect on this relation.

For co-linearity issue, all of the regression models have a VIF value between 1.208-3.608--meaning the concepts not correlated with each other.

### 6.8 Control Variables

Each control variable has both positive and negative relationship to dependent and independent variables. But all control variables included in the analysis were not statistically significant.

### 6.9 The Sobel Test

For significance of the mediation effect supported by the regression results, the researcher also used the Sobel Test to confirm the mediation. This study will use only significant relationship for testing. There are two mediation models to be tested.

### 6.10 Attitude and Behavior Mediated through Intention

The attitude concept and the behavior concept were mediated through intention behavior. The calculation uses a beta coefficient of attitude (independent variable) and intention's (dependent variable) regression model and also the unstandardized standard error of the attitude concept. Table 6 shows the result of the Sobel Test.

**Table 6:** The Sobel Test of Attitude and Behavior Mediated through Intention

Beta A (Attitude)	0.826
Beta B (Intention)	0.990
Standard error A (Attitude)	0.157
Standard error B (Intention)	0.190
Sobel test statistic	3.702
Two-tailed probability	0.001

Note: Unstandardized coefficient data was used.

The result is determined by the two-tailed p-value of the Sobel Test. The p-value appears below the 0.05 level, showing the mediation effect being confirmed.

### 6.11 Subjective Norm and Behavior of Adoption to M-commerce Mediated through Intention

The subjective norm concept and the behavior concept were mediated through intention behavior. The calculation uses a beta coefficient of the subjective norm (independent variable) and intention's (dependent variable) regression model and also the unstandardized standard error of the attitude concept. Table 7 shows the result of the Sobel Test.

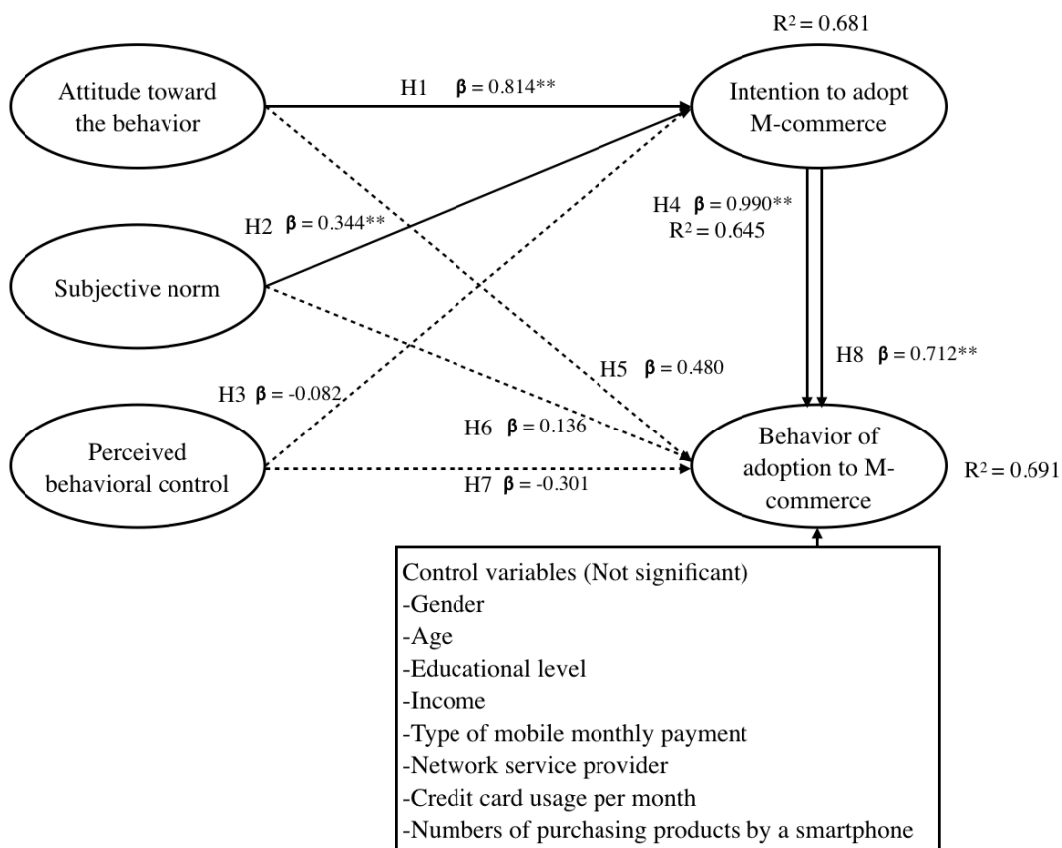
**Table 7:** The Sobel Test of Subjective Norm and Behavior Mediated through Intention

Beta A (Attitude)	0.448
Beta B (Intention)	0.990
Standard error A (Attitude)	0.199
Standard error B (Intention)	0.190
Sobel test statistic	2.066
Two-tailed probability	0.039

Note: Unstandardized coefficient data was used.

The result is determined by the two-tailed p-value of the Sobel Test. The p-value appears below the 0.05 level showing the mediation effect being confirmed.

The result of the Sobel Test confirmed the intention concept fully mediated with behavior. The conceptual model shows the relation between concepts.



**Figure 2:** The Conceptual Model's Results

Note: \* significant at 0.05 level  
 \*\* significant at 0.01 level  
 \*\*\* significant at 0.001 level

Lines with arrow: relation of the theory planned behavior model  
 Line without arrows: relation direct to behavior concepts

The conceptual model shows the relation between concepts. Hypotheses 1-4 show the mediated relationship and Hypotheses 5-8 point to the direct effect between dependent variables and the behavioral concept. The bold line means the relation is significant but the dot line means the relation is not significant.

## 7. Discussion

The researcher conducted a reliability test to ensure trustworthiness of the model. The result from Cronbach's alpha showed that all variables with a value over the acceptable range. This model can therefore be considered reliable. The validity test was also performed. The results from exploratory factor analysis (EFA) shows the varimax method extracting only 4 from 5 concepts. The researcher used the fixed extraction method to extract it correctly for the specific number of concepts and weight for each question; the component matrix table was used instead of the rotated component matrix to yield a better value. The weight of the questions is not in all 5 components. Three of five components shows a strong weight of questions in the first component. These problems could stem from errors of some answers in the questionnaire. It was possible that some respondents might have misinterpreted some questions and provided irrelevant answers. From the results of correlation and regression testing, the hypothesis of *perceived behavioral control* showed both the negative beta and not significant. This result was opposite to the hypothesis and the model of the theory of planned behavior. But the regression result showed that 7 of 8 hypotheses were significantly supported. The attitude and the subjective norm concept were mediated though the intention concept. This is a fully mediated model in the study. Moreover, each control variable carried both positive and negative effects, but all control variables were not statistically significant—indicating no significant effect on the model.

## 8. Conclusion

This study was to study the adoption of M-commerce in Thailand's retail market by using the theory of planned behavior (TPB). Three concepts for measuring were Attitude, Subjective norm and Perceived behavioral control. These three concepts led to intention which was fully mediated with the behavioral concept. The three concepts were predicted as positive and significant in their relationship to intention. The intention showed a positive and significant relationship to the behavior and, in turn, resulted in a fully mediated model.

The result from the hypotheses pointed to the attitude and the subjective norm carrying a positive and significant effect on the intention. The intention yielded a positive and significant on the behavior in adopting M-commerce. This model was statistically supported. It should be noted that the perceived behavioral control showed its result opposite to the researcher's prediction. The mediation effect was measured by testing all significant concepts (Attitude, Subjective norms, and Intention) with control variables directed to the behavior concept. The test predicted intention having a positive and significant effect on behavior. This result showed a fully mediated model through intention. Based on the analyzed results, the researcher concluded that positive attitude, support from family and friends would lead to intention in adopting M-commerce.

## 9. Future Research

The researcher would suggest narrowing down the area of study for more qualitative details in each specific method of purchasing; for example, specific types of payment such as transferring to account or using a credit card online, and purchasing channels, such as Instagram program, Facebook, websites or specific applications.

The other areas that should deserve investigation could be the age factor as pointed out in Nielsen e-Commerce Landscape Report (2018) and World Bank Group: Thailand at Glance (2018).

## 10. Limitation

The researcher perceived the limitation of the study in the nature of quantitative research that reports figures but lacks qualitative information on viewpoints from the respondents. Both quantitative and qualitative data could provide a more complete picture of the trend in which Thai consumers turn to M-commerce.

## 11. The Author

Pornprom Suthatorn is a full-time staff member of the Graduate School, Dusit Thani College, Bangkok, Thailand. His research interest is in the areas of retail market and the impacts of mobile commerce on retail businesses in Thailand.

## 12. Reference:

- Abbad, M.M. (2013). E-banking in Jordan. *Behavior & Information Technology*, 32(7), 681-694.
- Ajzen, I. (1991). Theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211 (1991).
- Ajzen, I. (2002). Constructing a TPB Questionnaire: Conceptual and Methodological Considerations. Printing Place: Publisher.
- Bhattacharjee, A. (2000). Acceptance of E-commerce services: the case of electronic brokerages. *IEEE Transactions on systems, man, and cybernetics-Part A: Systems and humans*, 30(4), 411-420.
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross Cultural Psychology*, 1(3), 185-216.
- Bulmer, M., Gibbs J., & Hyman, L. (2006). The Use of Pre-existing Survey Questions: Implications for Data Quality. Printing Place: Publisher.
- Duffey, K. (1997). Mobile commerce. (1997). Retrieved on 30 April 2018. From <http://public.logica.com/~mcommerce/ourvisio.htm>.
- Insa-Ciriza, R. (2001). Ecommerce and Mcommerce in Southern Europe. *European Retail Digest*, 32(1), 23.
- Khalifa, M. & Shen, K.N. (2008). Drivers for transactional B2C M-commerce adoption: extended theory of planned behavior. *Journal of computer information systems*, 48(3), 111-117.
- Kini, R.B. (2009). Adoption and evaluation of m-commerce in Chile. *Electronic Journal of Information Systems Evaluation*, 12(1), 75-87.



- Marci T. & Steve T. (2009). Effective optimization of web sites for mobile access: The transition from eCommerce to mCommerce. *Journal of Interactive advertising*, 9(1), 1-13.
- Meadows, K. A. (2003). So you want to do research? 5: Questionnaire design. *British Journal of Community Nursing*, 8, 562-570 (2003).
- Mishra, S. (2014). Adoption of M-commerce in India: Applying theory of planned behavior model. *Journal of Internet Banking and Commerce*, 19(1), 1-18.
- Nielsen e-Commerce Landscape Report. (2018). Retrieved on 30 April, 2018. From <https://www.marketingoops.com/news/ecommerce/trend-ecommerce-nielsen-2018/>.
- Nunnally, J. (1978). *Psychometric Methods*. Printing Place: Publisher.
- Rupton, R.A. (2002). Retail ecommerce in Slovak republic. *European Retail Digest*, 33(1), 38.
- Shannon, R. (2005). Letter. *European Retail Digest*, 46(1), 1-2.
- Sparks, P. & Shepherd, R. (1992). Self-identity and the theory of planned behavior: Assessing the role of identification with "green consumerism" *Social Psychology Quarterly*, 388-399.
- World Bank Group: Thailand at glance. (2018). Retrieved on 30 April 2018. From <http://pubdocs.worldbank.org/en/823661503543356520/Thailand-Economic-Monitor-August-2017.pdf>.

### 13. Appendix:

#### แบบสอบถามทัศนคติการซื้อสินค้าในอินเทอร์เน็ตผ่านโทรศัพท์มือถือ

การซื้อสินค้าผ่านอินเทอร์เน็ต (E-commerce) ได้พัฒนาเข้าสู่ยุคของการซื้อสินค้าผ่านโทรศัพท์มือถือ (M-commerce) ในปัจจุบันเพราะโทรศัพท์ในปัจจุบันสามารถเชื่อมต่อกับอินเทอร์เน็ตได้และสามารถใช้โปรแกรม (Application) หรือหน้าจอบrowser (Web Browser) ในการเลือกซื้อสินค้าได้และผู้ใช้สามารถชำระเงินผ่านช่องทางต่างๆเช่นบัตรเครดิตได้ทันที โดยที่ไม่ต้องเดินทางไปยังร้านค้าแบบสอบถามนี้จะวัดการรับเอาวิธีการซื้อสินค้าในอินเทอร์เน็ตผ่านโทรศัพท์มือถือของคนไทยในแง่มุมต่างๆประกอบด้วยหัวข้อหลัก 5 หัวข้อ รวม 23 คำถามโดย 1 หมายถึงไม่เห็นด้วยอย่างยิ่ง และ 5 หมายถึง เห็นด้วยอย่างยิ่ง

จัดทำโดยนักศึกษาระดับปริญญาเอกสาขาการจัดการวิทยาลัยนานาชาติสถาบันบัณฑิตพัฒนบริหารศาสตร์ (นิด้า) ข้อมูลของท่านจะถูกเก็บเป็นความลับและใช้ในทางการศึกษาเท่านั้น

#### หมวดที่ 1 ข้อมูลส่วนตัว

เพศ	<input type="checkbox"/> ชาย	<input type="checkbox"/> หญิง			
อายุของท่าน (ปี)	<input type="checkbox"/> ต่ำกว่า 20	<input type="checkbox"/> 21-30	<input type="checkbox"/> 31-40	<input type="checkbox"/> 41-50	<input type="checkbox"/> 51-60
	<input type="checkbox"/> 60 ขึ้นไป				
ระดับการศึกษา	<input type="checkbox"/> ต่ำกว่าปริญญาตรี	<input type="checkbox"/> ปริญญาตรี	<input type="checkbox"/> ปริญญาโท	<input type="checkbox"/> ปริญญาเอก	
รายได้ต่อเดือน (บาท)	<input type="checkbox"/> ต่ำกว่า 10,000	<input type="checkbox"/> 10,001-20,000	<input type="checkbox"/> 20,001-30,000	<input type="checkbox"/> 30,001-40,000	<input type="checkbox"/> 40,001-50,000
	<input type="checkbox"/> 50,000 ขึ้นไป				
เครือข่ายโทรศัพท์	<input type="checkbox"/> เอไอเอส	<input type="checkbox"/> ดีแทค	<input type="checkbox"/> ทรูมูฟ		
ชนิดการจ่ายเงิน	<input type="checkbox"/> รายเดือน	<input type="checkbox"/> เดบิตเงิน			
การใช้บัตรเครดิตต่อเดือน (ครั้ง)	<input type="checkbox"/> 0	<input type="checkbox"/> 1-5	<input type="checkbox"/> 6-10	<input type="checkbox"/> 10 ขึ้นไป	
ซื้อของออนไลน์ผ่านมือถือต่อเดือน (ครั้ง)	<input type="checkbox"/> 0-1	<input type="checkbox"/> 2-3	<input type="checkbox"/> 4-5	<input type="checkbox"/> 5 ขึ้นไป	

**หมวดที่ 2** สสำรวจความคิดเห็นต่อการซื้อสินค้าผ่านอินเทอร์เน็ตโดยโทรศัพท์มือถือ

**ทัศนคติการซื้อสินค้าในอินเทอร์เน็ตผ่านโทรศัพท์มือถือ (Attitude toward M-commerce)**

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	เฉยๆ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
	1	2	3	4	5
ฉันคิดว่าการซื้อสินค้าผ่านอินเทอร์เน็ตผ่านโทรศัพท์มือถือเป็นความคิดที่มีประโยชน์					
การซื้อสินค้าผ่านโทรศัพท์มือถือเป็นประสบการณ์ที่ดีของฉัน					
การซื้อสินค้าผ่านโทรศัพท์มือถือทำให้ฉันคุ้มค่าเงินและเวลา					
การซื้อสินค้าผ่านโทรศัพท์มือถือเป็นเรื่องที่ดูโง่เขลา					
ฉันรู้สึกได้ประโยชน์จากการซื้อสินค้าผ่านโทรศัพท์มือถือ					

**การคล้อยตามกลุ่มอ้างอิงของการซื้อสินค้าในอินเทอร์เน็ตผ่านโทรศัพท์มือถือ (Subjective norms toward M-commerce)**

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	เฉยๆ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
	1	2	3	4	5
ฉันจะซื้อสินค้าผ่านโทรศัพท์มือถือ ถ้าฉันได้รับคำแนะนำจากคนที่มีอิทธิพลกับฉัน					
ฉันจะซื้อสินค้าผ่านโทรศัพท์มือถือ ถ้าฉันได้รับคำแนะนำจากคนที่มีความสำคัญกับฉัน					
ฉันต้องการให้เพื่อนหรือครอบครัวของฉันคิดว่าสิ่งที่ฉันทำนั้นควรทำ					
มันไม่สำคัญว่าคนอื่นคิดกับฉันอย่างไรกับการซื้อสินค้าผ่านโทรศัพท์มือถือ					
คุณเป็นห่วงว่าเพื่อนหรือครอบครัวจะคิดอย่างไรเกี่ยวกับการซื้อของคุณ					

**ความสามารถในการควบคุมพฤติกรรมของการซื้อสินค้าในอินเทอร์เน็ตผ่านโทรศัพท์มือถือ**

**(Perceived behavioral control toward M-commerce)**

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	เฉยๆ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
	1	2	3	4	5
ฉันสามารถตัดสินใจได้เองโดยไม่ต้องการคำแนะนำจากผู้อื่น					
ฉันเชื่อว่าฉันสามารถควบคุมความตั้งใจที่จะซื้อได้ แม้คนอื่นบอกให้ฉันหยุดซื้อ					
การซื้อหรือไม่ซื้อขึ้นอยู่กับตัวฉันเองคนเดียวเท่านั้น					
การซื้อไม่ใช่การตัดสินใจของตัวฉันเองคนเดียวทั้งหมด					
ไม่มีใครที่สามารถทำลายการตัดสินใจของฉัน เมื่อฉันจะซื้อสินค้าผ่านโทรศัพท์มือถือ					

ความตั้งใจส่วนตัวที่จะใช้งานการซื้อสินค้าในอินเทอร์เน็ตผ่านโทรศัพท์มือถือ (Intention to adopt M-commerce)

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	เฉยๆ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
	1	2	3	4	5
ฉันจะเริ่มต้นหรือยังคงใช้โทรศัพท์มือถือซื้อสินค้าผ่านอินเทอร์เน็ตต่อไป					
ฉันตั้งใจที่จะซื้อสินค้าผ่านโทรศัพท์มือถือในอนาคต					
ฉันจะแนะนำการซื้อสินค้าผ่านโทรศัพท์มือถือให้เพื่อนของฉัน					
ฉันคิดว่าจะหยุดการซื้อสินค้าผ่านโทรศัพท์มือถือเร็วๆนี้					
การซื้อสินค้าผ่านโทรศัพท์มือถือจะเป็นช่องทางแรกที่ฉันนึกถึง					

พฤติกรรมการซื้อสินค้าในอินเทอร์เน็ตผ่านโทรศัพท์มือถือ (Behavior of people adoption to M-commerce)

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	เฉยๆ	เห็นด้วย	เห็นด้วยอย่างยิ่ง
	1	2	3	4	5
ฉันซื้อสินค้าผ่านโทรศัพท์มือถือเป็นประจำ					
ฉันไม่เคยซื้อสินค้าผ่านโทรศัพท์มือถือเลย					
ฉันซื้อสินค้าผ่านโทรศัพท์มือถือบ่อยครั้ง					

ขอขอบคุณที่สละเวลาให้ข้อมูล