M-commerce: Examining the Adoption of Mobile Commerce in Bangkok, Thailand: The Moderating Effect of Education Level

เอ็ม-คอมเมิร์ซ : การทดสอบการยอมรับพาณิชย์อิเล็กโทรนิกส์ผ่านอุปกรณ์เคลื่อนที่ในกรุงเทพมหานคร ประเทศไทย : อิทธิพลตัวแปรกำกับของระดับการศึกษาของผู้ใช้งาน

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Abstract

This research examined the adoption of mobile commerce in retail mobile shopping service in Bangkok, Thailand. Theory of planned behavior (TPB) was selected as a conceptual model to investigate the mobile user's adoption in purchasing retail products via their smart devices. This study enhanced an existing TPB model by investigating how user's education level affect their adoption of m-commerce by proposing the education level as a moderator between intention to adopt mobile commerce and behavioral of adoption mobile commerce. The questionnaire survey data from 168 respondents who live in Bangkok were collected. The results from a partial least squares regression analysis statistically supported seven of eight hypotheses of the proposed theoretical model. The finding illustrated that attitude, subjective norm toward m-commerce influenced the user's behavior of adoption through their intention to use m-commerce. Moreover, the results also found that users who have a higher education level tend to adopt m-commerce more than who possessed a lower level of education. This research suggested the company should concerned users' attitude toward m-commerce by not only considering the ease of use of their m-commerce's user interface but also the security issue, and focusing in influencers who were able to influence new users.

Keywords: M-commerce, Partial Least Square, Theory of Planned Behavior

บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์ในการทดสอบการเปิดรับการทำธุรกรรมพาณิชย์ผ่านอุปกรณ์สื่อสารเคลื่อนที่ (M-commerce) ในด้านการซื้อสินค้าอุปโภคบริโภคในประเทศไทย ผู้วิจัยใช้ทฤษฎีพฤติกรรมตามแผนในการทดสอบการยอมรับของผู้ใช้งานอุปกรณ์สื่อสารเคลื่อนที่ต่อการซื้อสินค้าอุปโภคบริโภคบนอุปกรณ์ดังกล่าว

งานศึกษานี้ได้ขยายผลเพิ่มเติมจากทฤษฎีพฤติกรรมตามแผนเดิม โดยใช้ระดับการศึกษาของผู้ใช้งานเป็นตัวแปรกำกับของความสัมพันธ์ระหว่างแรงจูงใจในการเปิดรับการทำธุรกรรมพาณิชย์ผ่านอุปกรณ์สื่อสารเคลื่อนที่และพฤติกรรมการเปิดรับธุรกรรมพาณิชย์ผ่านอุปกรณ์สื่อสารเคลื่อนที่ โดยข้อมูลที่ใช้ในการทดสอบได้มาจากผู้ใช้งานโทรศัพท์เคลื่อนที่ในกรุงเทพมหานคร ประเทศไทยจำนวน 168 คน โดยใช้แบบสอบถามในการเก็บข้อมูล ผลลัพธ์จากการวิเคราะห์ผ่านวิธีการถดถอยกำลังสองน้อยที่สุดบางส่วน (Partial least squares regression: PLS) พบว่า 7 ใน 8 ของสมมติฐานของทฤษฎีพฤติกรรมตามแผนได้รับการรับรองแบบมีนัยยะสำคัญทางสถิติ ผลการวิจัยทำให้เห็นว่าทัศนคติ, บรรทัดฐานทางสังคมเกี่ยวกับการทำธุรกรรมพาณิชย์ผ่านอุปกรณ์สื่อสารเคลื่อนที่ส่งผลต่อพฤติกรรมการยอมรับของผู้ใช้งานผ่านความตั้งใจในการใช้งานการทำธุรกรรมพาณิชย์ผ่านอุปกรณ์สื่อสารเคลื่อนที่ นอกเหนือจากนั้น ผลงานวิจัยพบว่าผู้ใช้งานที่มีระดับการศึกษาสูงมีแนวโน้มยอมรับการทำธุรกรรมพาณิชย์ผ่านอุปกรณ์สื่อสารเคลื่อนที่มากกว่าผู้ใช้งานที่มีการศึกษาที่ต่ำกว่า งานวิจัยนี้เสนอแนะให้บริษัทคำนึงถึงทัศนคติของผู้ใช้งานเกี่ยวกับการทำธุรกรรมพาณิชย์ผ่านอุปกรณ์สื่อสารเคลื่อนที่ โดยไม่เพียงพิจารณาเฉพาะเรื่องความง่ายของส่วนต่อประสานกับผู้ใช้แต่ควรพิจารณาด้านความปลอดภัยในการใช้งานด้วย และมุ่งเน้นไปที่ผู้ที่มีอิทธิผลต่อผู้ติดตามเพราะเป็นคนที่สามารถดึงดูดผู้ใช้งานใหม่เข้ามาได้

คำสำคัญ : พาณิชย์อิเล็กทรอนิกส์ผ่านอุปกรณ์เคลื่อนที่ การถดถอยกำลังสองน้อยที่สุดบางส่วน
ทฤษฎีพฤติกรรมตามแผน

Introduction

Thailand is one of the countries that most population can access to the internet. According to the report of Hootsuite (2019), over 82.6 percent of the Thai population are the active internet users. The main reason of using the internet of Thai people is connecting with friends in social networks such as Facebook, Line, Instagram, watching videos or listening to music, gathering needed information and purchasing products online. Generally, Thailand online marketplace or electronic commerce (e-commerce) is growing rapidly in various business categories in consecutive years (Hootsuite, 2019).

Particularly, many Thai online marketplaces are transformed from personal computer-based into mobile-based usage. Due to 79 percent of Thai internet users are accessing the internet through mobile devices (Hootsuite, 2019). This change makes existing and new coming companies to obtain tremendous opportunities to grow their business through mobile commerce (M-commerce) channel. However, even there is a high percentage of expansion of m-commerce in online marketplaces. The recent study indicates that

m-commerce is still a small proportion comparing to the e-commerce worldwide (Thongpapanl, Ashraf, Lapa, & Venkatesh, 2018). Similarly, in Thailand, therefore, it is important to study the factors that influence Thai people to adopt mobile commerce.

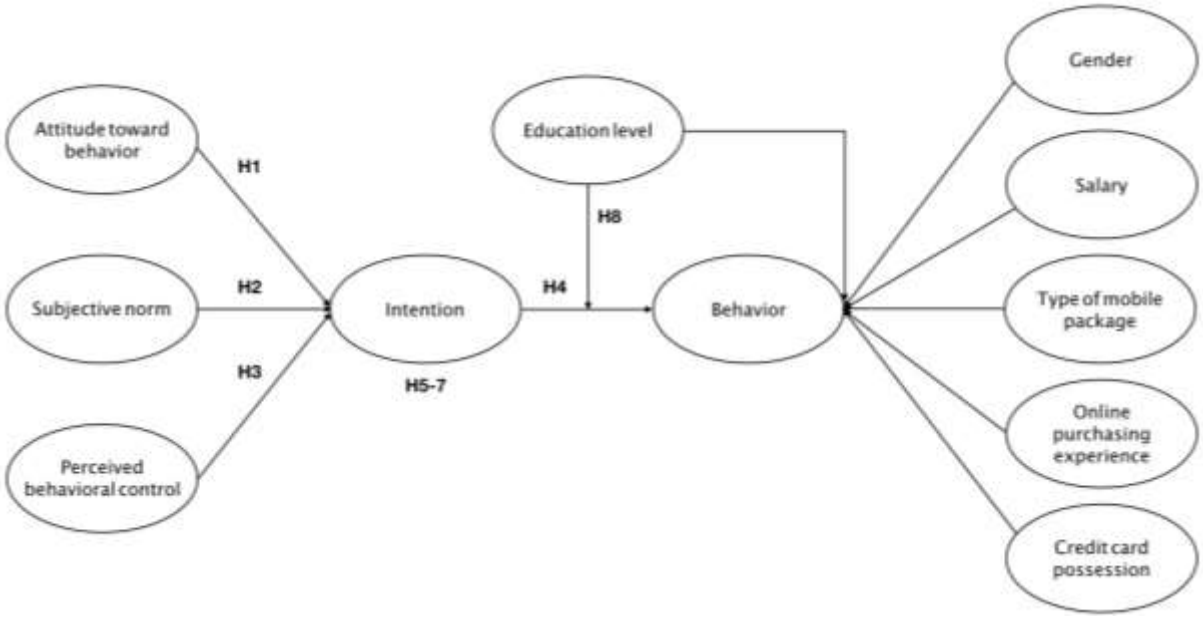
To investigate the adoption of mobile commerce of Thai people, this study adopted the model of theory of planned behavior (TPB) as a theoretical model for the analysis. This model has a wide acceptance in examining the adoption of M-commerce in various countries (Abbad, 2013; Insa-Ciriza, 2001; Khalifa & Shen, 2008; Kini, 2009; Mishra, 2014). However, there is a lack of empirical evidence of this theory in Thailand's context. In addition, the author also proposed an educational level as a moderator which may offer additional insight about how Thai people adopt m-commerce. Results from this study will help an entrepreneur or a manager to have an understanding of how Thai internet consumers confidently purchase products or services via an online channel.

Objectives

According to research topic, the author aimed to investigate how mobile users decided to purchase products or services online by their mobile devices. Using a theoretical model of the theory of planned behavior (TPB) which widely used in m-commerce context, the relationships in the model represented objectives of this study as listed below:

1. To examine the relationship between attitude toward the behavior and intention to adopt m-commerce.
2. To examine the relationship between subjective norm and intention to adopt m-commerce.
3. To examine the relationship between perceived behavioral control and intention to adopt m-commerce.
4. To examine the relationship between intention to adopt m-commerce and behavior of adoption m-commerce.
5. To examine the mediating effect of intention to adopt m-commerce that explains the relationship between attitude toward the behavior, subjective norm, perceived behavioral control and behavioral of adoption to m-commerce.
6. To examine a moderating role of educational level to a relationship between an intention to adopt m-commerce and the behavior of adoption m-commerce.

Conceptual Framework



Definition of Terms

M-commerce: Mobile Commerce refers to business activities of exchanging goods or services which will be done through internet that is connected with mobile devices such as mobile phones, tablets or others.

E-commerce: Electronic Commerce refers to business activities of exchanging goods or services which will be done through Internet and is connected with personal computer and laptop usage.

Literature Review

M-commerce

After the Internet has connected millions of devices worldwide. A marketplace is not restricted only in traditional places but also in the Internet or virtual market. People can seek for information of products and services that they are interested and can purchase them through any online channels which is all together called an electronic Commerce (e-commerce). Apart from a well-known e-commerce, a mobile commerce (m-commerce) was emerged. Due to mobile devices have been developed in terms of their functions together concerning new technology year by year. These devices allow users to utilize their benefits as good as personal computers (PC). Nowadays, users can use their mobile devices to do almost everything as a PC can do. Even transactions that required high security such as financial transactions can be done through mobile devices. Therefore, traditional business companies are able to reach

more internet end users than ever which make M-commerce is a more global business opportunity for entrepreneurs and managers around the world (Shao Yeh & Li, 2009).

Since m-commerce was first introduced by Kevin Duffey in 1997 (Bermudez, 2002). Many companies in various markets come into a mobile commerce sector every year. The very first company that try to transform themselves into m-commerce was Coca-Cola. They invented the vending machine which accepted payments using short message service (SMS). Until today, M-commerce has been expanded into many business industries. For example, In South Korea, people are able to buy any retail product using QR codes on advertisement in any subway stations by scanning the particular QR code which belongs to the items they are interested. Then, they will be charged on their mobile phone's monthly payment.

In Thailand, Hootsuite (2019) reported that the online marketplace had a considerable growth last year. The most preferred online shopping categories were on travel and accommodation, as well as electronic devices and fashion and beauty products. However, M-commerce still accounted as a small portion comparing to the e-commerce (Thongpapanl et al., 2018).

In addition, even researchers predicted that the growth of e-commerce will make m-commerce increase in its scale in the future (Insa-Ciriza, 2001). It is still important to study which aspects affect a person to adopt M-commerce in their daily life. The previous research indicated that there were some factors that influence the adoption of m-commerce. For example, Kini (2009) found that the element that helped an individual to use m-commerce is a better Internet connection, a high-security issue and reliability of M-commerce system. Troutman and Timpson (2008) stated that a good website interface made users feel persuasive to use and also related to user's perception of reliability.

In order to study how persons adopt m-commerce, previous research suggested that there are many theories that have been used to investigate this issue (Kalinic & Marinkovic, 2016). However, the author chose the theory of the planned behavior (TPB). The details of this theory will be discussed in the next section.

Theory of Planned Behavior (TPB)

To study an individual's intention to perform a given behavior, this research used the theory of planned behavior (TPB) (Ajzen, 1991) to study the adoption of m-commerce in Bangkok, Thailand. Generally, TPB is one of the most famous theories that used in a study in IT adoption such as e-commerce (Bhattacherjee, 2000). In particular, many research

confirmed that this model gained broadly acceptances in an investigation of adoption of m-commerce in many countries (Abbad, 2013; Insa-Ciriza, 2001; Khalifa & Shen, 2008; Kini, 2009; Mishra, 2014). TPB model consists of three antecedent variables which influence an intention to adoption which in turn lead to a behavior of adoption.

Attitude Toward Behavior

The attitude toward behavior refers to a degree of favorable or unfavorable to perform a particular action (Ajzen, 1991). Persons tend to have a positive attitude if the behavior they are considering will lead to a favorable outcome (Mathieson, 1991). For example, if mobile users are considering to use m-commerce in purchasing products online, the expected outcome will be an ease of use of user interface, a good security procedure for the transaction, and the convenience compared to a traditional retail shop.

Subjective norm

Subjective norm means a perception of social support or not support to exhibit a given action (Ajzen, 1991). In particular, social support refers to an opinion of others who are able to motivate them to do a particular behavior (Mathieson, 1991). For example, mobile users might feel anxious when they buy products and make a payment online by filling their credit card information on a particular website or application. However, their anxiety will be lessened when they perceived that their family, friends, colleagues, or other persons who can influence them also make a transaction online.

Perceived Behavioral Control

Perceived behavioral control refers to the ease or difficulty to perform a particular action (Ajzen, 1991). Persons will assess their resources, abilities, and opportunities in order to enact the particular behavior. If they feel that they sufficiently have those requirements to perform an action, they will feel easy to adopt the behavior. Otherwise, they might feel difficult to perform. For example, if mobile users feel that they are not a technology savvy person, they might feel that they do not have enough skills to complete a transaction online correctly by themselves. Thus, they will perceive that making transaction online is complicated and insecure. Therefore, they will not adopt m-commerce. On the other hand, if they feel comfortable making an online transaction, they will easily adopt m-commerce.

Intention

Intention refers to persons' motivation to perform the given behavior (Ajzen, 1991). Generally, the intention concept in TPB is predicted by three variables: attitude, subjective norm, and perceived behavioral control. Therefore, a higher degree of those antecedent variables, the higher intention to perform the particular action they have. For example, if mobile users feel that purchasing products online is convenient, their friends, colleagues, and others people they know usually buy products online, and they feel that it is easy to make an online transaction, these will make them have an intention to adopt an online purchasing behavior.

Behavior

Behavior refers to a person's action in a particular behavior (Ajzen, 1991). According to the model, this means the stronger intention to use m-commerce, the more possibility that mobile users will adopt m-commerce in action.

There are abundant of empirical evidence of TPB in literature. In fact, this theory already proofs the adoption of m-commerce in various countries. For example, Khalifa and Shen (2008) constructed research about the adoption of m-commerce in Hong Kong. The authors stated that there is a high usage of mobile internet in this territory. However, a low level of adoption of m-commerce is reported in this region. Theory of planned behavior (TPB) was selected to investigate this problem. The results showed that attitude, subjective norms have a positive and significant relationship to mobile user's intention to adopt m-commerce which lead to a behavior of adoption m-commerce. The researchers concluded that the intention to adopt m-commerce came from the attitude of themselves and the norms of society. Because during that the time period of research, privacy, efficiency, cost and security issues were the factors that still people were concerned in Hong Kong. These made people feel insecure to adopt m-commerce at the time.

Moreover, Mishra (2014) applied the TPB model in India to investigate the adoption of m-commerce. The author stated that he believes that the relationship between attitude toward the behavior, subjective norms and perceived behavioral control will have a positive and significant effect to the intention of adoption in m-commerce. However, the results do not match what he expected due to the relationship between subjective norm and intention is not significant.

However, there is a lack of evidence of adoption of m-commerce in Thailand. The author not only adopts TPB model as same as scholars from other countries but also add an

additional moderating variable to understand a deeper insight about how Thai people adopt m-commerce.

From the adoption of this theoretical model, together with these evidences have been proved appropriateness to use TPB as a conceptual model to investigate the adoption of m-commerce, the author proposed these following hypotheses:

Hypothesis 1: Attitude toward behavior will have a positive and significant effect on the intention to adopt m-commerce.

Hypothesis 2 : Subjective norm will have a positive and significant effect on the intention to adopt m-commerce.

Hypothesis 3 : Perceived behavioral control will have a positive and significant effect on the intention to adopt m-commerce.

Hypothesis 4 : Intention of individual usage of m-commerce will have a positive and significant effect on behavior of adoption m-commerce.

Mediating Effect in Theory of Planned Behavior

According to TPB model, attitude toward behavior, subjective norm, and perceived behavioral control have an effect to an intentional concept which finally leads to the behavior. This means that those independent variables indirectly influence a person to perform given action through an intention variable. Therefore, an intention serves as a mediator of this model.

In order to provide an extra theoretical contribution to the literature, the author needed to investigate the mediating effect of intention. These set of hypotheses are presented:

Hypothesis 5: The positive relationship between attitude toward m-commerce and behavior of adoption m-commerce will be mediated by intention to adopt m-commerce

Hypothesis 6: The positive relationship between subjective norm and behavior of adoption m-commerce will be mediated by intention to adopt m-commerce

Hypothesis 7: The positive relationship between perceived behavioral control and behavior of adoption m-commerce will be mediated by intention to adopt m-commerce

Moderating Role of Education Level

Although the results from the theory of planned behavior are sufficient to explain the understanding of how people adopt the desired behavior. The author argued that there is a factor that may influence a person to adopt m-commerce. An education level was proposed

as a moderator of a relationship between intention to adopt m-commerce and behavior of adoption m-commerce.

Generally, m-commerce seems to be a complex task for a person who is not familiar with IT. Persons required self-efficacy to deal with an unfamiliar procedure to complete the transaction through a smart mobile device. The previous study of Delcourt and Kinzie (1993) supported that individuals with higher educational background perceived a higher efficacy to use new technology more than who have a lower education level. Moreover, Rammstedt and Rammsayer (2002) found that education level moderated the results of their study due to the data had been collected from people from a different education background. Therefore, it is interesting to investigate how different educational level affect the behavior of adoption m-commerce in this study. This leads to the last hypothesis:

Hypothesis 8: The positive relationship between intention to adopt m-commerce and behavior of adoption m-commerce will be positively moderated by education level.

Control Variables

This study included control variables in the model for testing their effect on the research outcome. First, gender was expected to associate with a behavioral of adoption to m-commerce due to recent studies found that women were engaged in online shopping more than men (Pascual-Miguel, Agudo-Peregrina, & Chaparro-Peláez, 2015; Wu, Quyen, & Rivas, 2017). Second, salary is apparently associated to an individual's purchasing power. In online shopping context, there are several studies support that salary affect online shopping behavior (Antoniadis, Saprikis, & Poltitis, 2014; Sundström, Balkow, Florhed, Tjernström, & Wadenfors, 2013). Third, the type of mobile package refers to the type of payment that user used to pay for their monthly mobile usage which normally has two types: prepaid and postpaid. A prepaid mobile package is a package that users need to pay money in advance before using their mobile services. Users can use mobile services according to the money they have in that mobile number. Oppositely, a postpaid mobile package is the package that users are allowed to make a payment after their mobile usage. Generally, the charge will be made on users equally every month except they had used mobile services over the limit of the chosen package. In fact, in Thailand context, a postpaid mobile package is required users to have an age over 18 and have to pay the bill every month for avoiding losing their financial credit. Thus, the postpaid users seem to have a steadier income to pay the mobile

bill every month. Therefore, the postpaid mobile package users were expected to associate with behavior of adoption m-commerce more than the prepaid users. Fourth, online purchasing experience is obviously recognized that is the potential target group for m-commerce due to their existing experiences in online shopping. This assumption supported by a study of Hernández, Jiménez, and Martín (2010) who investigated that how past purchasing experiences were associated with a behavior of repurchasing products online. Lastly, credit card possession is one of the most important factors to achieve m-commerce because it allows users to instantaneously make a payment online. However, the study of Katawetawaraks and Wang (2011) revealed that credit card not only encourages users to participate in online shopping but also concerned about security issue if they make a payment via online channel. Therefore, a credit card possession might relate to a behavior of the adoption of m-commerce.

Research Method

Sample

The sample of this research is people who currently live in Bangkok, Thailand. The 242 self-administered questionnaires were distributed at the shopping mall in three different locations in Bangkok. The executive of the shopping mall was contacted for permission to collect the data. The data was collected by random sampling method. The respondents were asked about their volunteers to participate in our survey before the questionnaires were distributed in person. On top of every questionnaire, the respondents also were informed about their anonymity and the confidentiality of the results. After participants complete the questionnaire, the author collected it back in person.

Measures

The questionnaire contained three sections as follow. The first part is a pre-screen question which measured by asking respondents that “Do you usually use internet from a mobile phone or other mobile devices?”.

The second part is a measurement of adoption of m-commerce. This author used scales adopted from the theory of Planned Behavior Questionnaire from Ajzen (1991) which consists of five variables First, attitude toward behavior consists of 5 items. The samples of questions are “the idea of purchasing products on the internet via mobile phone is usefulness”, and “Using mobile purchasing is a pleasant experience to me”. Second, the

subjective norm consists of 5 items. The samples of questions are “If I have ever be suggested by who influence me to purchasing products via smart phone, I will do”, and “If I have ever be suggested by who important to me to purchasing products via smart phone, I will do”. Third, behavioral control consists of 5 items. The samples of questions are “If I want to purchase products via smart phone, I can decide without suggesting from others people.”, and “I believe that I can control my intension to purchase product by smart phone, even others told you to stop.”. Fourth, intention consists of 5 items. The samples of questions are “I will start or continue to use a smart phone for purchasing products.”, and “I intend to purchase products online by smart phone in future.”., and behavioral consists of 3 items. The samples of questions are “I had purchased products by smart phone regularly.”, and “I never purchase anything from my smart phone.”. All items are measured by using 5-point Likert-scales ranging from 1 (strongly disagree) to 5 (strongly agree). However, some questions were modified to suit a mobile commerce’s context. For example, “the idea of purchasing products on the internet via mobile phone is usefulness” or “If I have ever been suggested and by whom influencing me to purchase products on the internet by mobile phone, I will do”.

Moreover, the author used existing scales which have used by other researchers. The advantages of using existing scales are, first, the validity and reliability of the scales have been tested beforehand (Hyman, Lamb, & Bulmer, 2006). Second, the author can compare the result with other studies which used the same scale (Meadows, 2003). Lastly, it saves time rather than developing new scales (Hyman et al., 2006). Moreover, these existing scales were developed originally in English but the respondents who participated in this research are Thai. The author hired the Thai native bilingual who is an expert in English to translate all of the scales into Thai and then back-translated to English by a native English bilingual who is also fluent in Thai to ensure the scales’ validity (Brislin, 1970).

Last part is a measurement of personal characteristics. These set of control variables include age (measured by number of age-year of respondent), gender (measured by selecting their gender; 1 = male and 0 = female), salary (measured by selecting their range of monthly income (in THB); 1 = below 10,000, 2 = between 10,001 to 20,000, 3 = between 20,001 to 30,000, 4 = between 30,001 to 40,000, 5 = between 40,001 to 50,000 and 6 is 50,000 and above), type of mobile package (measured by selecting prepaid (0) or postpaid (1)), online purchasing experience (measured by selecting the range of average times that they usually purchased product online per month; 0 = never purchase product online, 2 = 1-2 times, 3 =

3-4 times, 4 = over 5 times per month), credit possession (measured by answering yes (1) and no (0)) and education level (measured by selecting their education level; 1=below bachelor degree, 2=bachelor degree, 3=master degree, 4=doctoral degree).

Data Analysis

The author used partial least squares regression (PLS) to analyze the data because it is an appropriate technique for this research. First, PLS encompasses principal component analysis, path analysis, and a set of regressions to generate estimates of standardized regression coefficients for the model's paths and factor loadings for the measurement items. Second, PLS allows a small size of data to be analyzed more effective than other SEM technique due to its resample technique (Chin, 1998). Third, it suitable for non-normalized data to be analyzed which produces less bias (Kline, 2005). The PLS-SEM was conducted in WarpPLS 6.0.

Results

The first question is a pre-screened question to filter out the person who has a mobile device which can access the internet. The respondents were expected to answer "yes" due to an eligibility to use this questionnaire to analyze the adoption of m-commerce. After the collection period, 182 questionnaires were returned which yield a 75.2 percent response rate. However, there were 11 uncompleted questionnaires and 3 respondents reported that they did not possess mobile devices with internet connectivity. Therefore, these were excluded from our data. Therefore, 168 completed questionnaires were collected which have no missing data. The respondents' demographic data are reported in table 1 below:

Table 1: Demographic and characteristic of samples

Variables	Descriptive statistics
Gender	Male: 73 (43.45%)
	Female: 93 (56.55%)
Age (in year)	Means: 31.92
	Standard deviation: 10.81
Educational level	Below Bachelor's degree: 26 (15.48%)
	Bachelor's degree: 102 (45%)
	Master degree: 37 (50%)
	Doctoral degree: 3 (5%)

Variables	Descriptive statistics
Salary (THB)	Below 10,000: 19 (11.31%)
	10,001-20,000: 56 (33.33%)
	20,001-30,000: 32 (19.08%)
	30,001-40,000: 21 (12.5%)
	40,001-50,000: 20 (11.9%)
	Above 50,000: 20 (11.9%)
Type of mobile package	Prepaid: 64 (25%)
	Postpaid: 104 (75%)
Online purchasing experiences	Never: 66 (39.29%)
(per month)	1-2 times: 68 (40.48%)
	3-4 times: 22 (13.1%)
	Over 5 times: 12 (7.14%)
Credit card possession	Own credit card: 70 (41.68%)
	Do not have a credit card: 98 (58.33%)

The validity and reliability were performed before conducting PLS analysis. For validity test, first, the convergent validity was tested by using factor loadings to examine how well the item measured their variable. All of items of each construct were above a minimum threshold recommended by Hair, Black, Babin, and Anderson (2009) except one question of the subjective norm has a loading below 0.5. Therefore, it was removed from the analysis. Second, discriminant validity was tested to ensure that each variable is discriminated from others by comparing the square root of average variance extracted (AVE) with the correlation of itself to other variables. The results showed that AVE of all constructs are higher than other correlations they involved with which means discriminant validity is acceptable (Fornell & Larker, 1981). The results of correlation and average variance extracted are shown in Table 1.

For the reliability test, the author used Cronbach's alpha and composite reliability to ensure that constructs are reliable. the result indicated that all variables have a value over 0.7 which are acceptable (Fornell & Larker, 1981; Nunnally, 1978). This means that all constructs always yield the same results. The results of Cronbach's alpha, composite reliability is reported in table 2.

Next, multicollinearity was checked by using the variance inflation factor (VIF) to ensure that two or more variables in this model are not highly correlated. This study used the full VIF test because it can capture both vertical and lateral collinearity in this model. The results indicate that full VIF value is ranging from 1.557 to 3.123 which mean there is no concern about collinearity in this model (Petter, Straub, & Rai, 2007). Moreover, Kock and Lynn (2012) stated that full VIF can also detect common method bias (CMB). However, if the value of full VIF is not over 3.3, the CMB is not serious in this research.

Lastly, the normality of the data was tested. The results from the Jarque-Bera test of normality (Normal-JB) and the robust Jarque-Bera test of normality (Normal-RJB) indicate that one main variable (subjective norm) is not normally distributed. This made PLS-SEM suitable for our analysis.

The results of PLS analysis is reported in figure 1. The standardize coefficient and t-value were calculated using a bootstrap resampling technique. The author used subsamples of 100 as recommended by (Efron, Rogosa, & Tibshirani, 2004).

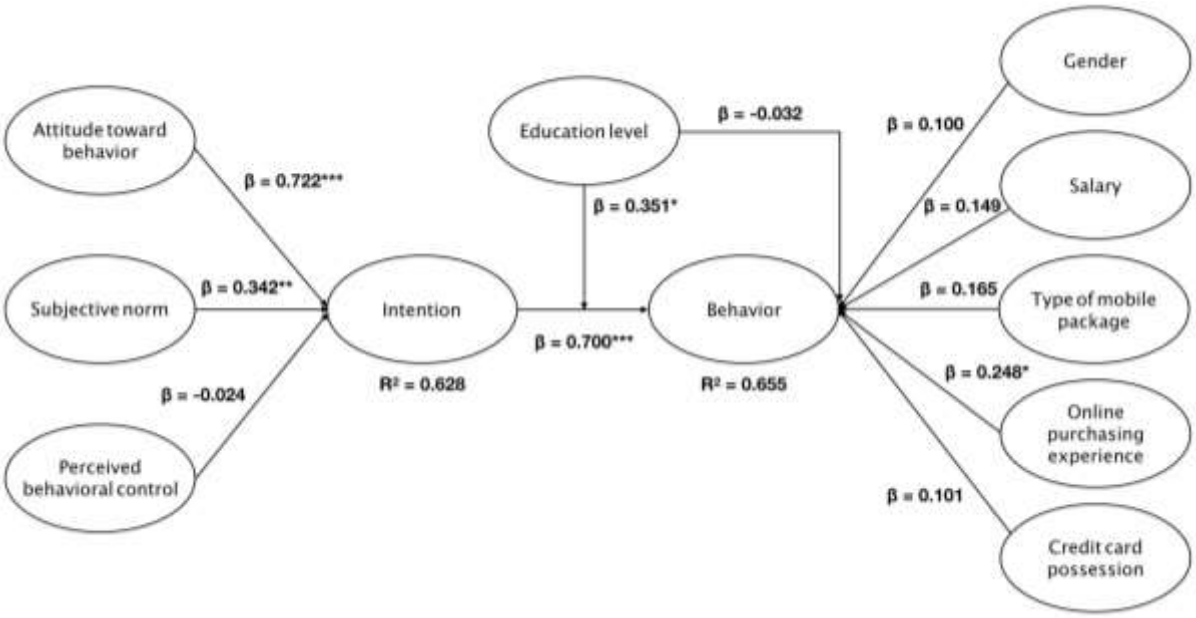


Figure 1: The results from PLS analysis

Table 1: The result of correlation and average variance extracted (AVE)

	ATT	NOR	PER	INT	BEH	GEN	TYP	EDU	SAL	CRE	EXP
ATT	(.764)										
NOR	.063	(.810)									
PER	.385*	-.010	(.694)								
INT	.735***	.387*	.251	(.820)							
BEH	.616***	.327*	-.002	.716***	(.877)						
GEN	-.166	.279	.078	.072	.138	(1.00)					
TYP	.262	-.074	-.003	.251	.144	-.118	(1.00)				
EDU	-.281	-.073	-.219	-.205	-.076	.210	.000	(1.00)			
SAL	.059	.161	.001	.177	.309	.460**	.134	.381*	(1.00)		
CRE	.099	-.023	-.185	.116	.386*	.225	.293	.378*	.749	(1.00)	
EXP	.288	.112	-.225	.235	.443	.028	.079	.035	.212	.510	(1.00)

Note: ATT=Attitude toward m-commerce, NOR= Subjective norm, PER=Perceive behavioral control, INT=Intention to adopt m-commerce, BEH=Behavior of adoption m-commerce, GEN=Gender, TYP=Type of mobile package, EDU=Education level, SAL=Salary, CRE=Credit card possession, EXP=Online purchase experience.

The square root of average variance extract (AVE) presented in parentheses.

*= p<0.05, **= p<0.01, ***= p<0.001

Table 2: Cronbach's alpha and composite reliability

	ATT	NOR	PER	INT	BEH
Cronbach's alpha	0.873	0.883	0.803	0.910	0.908
Composite reliability	0.816	0.821	0.868	0.875	0.844

Note: ATT=Attitude toward m-commerce, NOR= Subjective norm, PER=Perceive behavioral control, INT=Intention to adopt m-commerce, BEH=Behavior of adoption m-commerce

To examine the relationship between attitude toward the behavior and intention to adopt m-commerce.

Hypothesis 1, the attitude toward behavior was expected to have a positive and significant effect on the intention to adopt m-commerce. The result indicated that there was a significant positive relationship between these variables (β = 0.722, $p < 0.001$). Hypothesis 1 is strongly supported.

To examine the relationship between subjective norm and intention to adopt m-commerce.

Hypothesis 2, subjective norm was expected to have a positive and significant effect on the intention to adopt m-commerce. The result indicated that there was a significant positive

relationship between these variables (β = 0.342, p = 0.004). Hypothesis 2 is statistically supported.

To examine the relationship between perceived behavioral control and intention to adopt m-commerce.

Hypothesis 3, perceived behavioral control was expected to have a positive and significant effect on the intention to adopt m-commerce. The result indicated that there was a positive relationship between these variables. However, it is not statistically significant (β = -0.024, p = 0.441). Hypothesis 3 is not supported.

These relationships (attitude, subjective norm, and perceived behavioral control to intention) explained about 62.8% (Adjusted R^2 = 0.628) of intention to adopt m-commerce.

To examine the relationship between intention to adopt m-commerce and behavior of adoption m-commerce.

Hypothesis 4, intention to adopt m-commerce was expected to have a positive and significant effect on behavior of adoption m-commerce. The result indicated that there was a significant positive relationship between these variables (β = 0.700, p < 0.001). The hypothesis 4 is strongly supported.

This relationship (intention to behavior) explained about 65.5% (Adjusted R^2 = 0.655) of intention to adopt m-commerce. Next, Hypothesis 5-7 will be examined a mediating effect of this model.

To examine the mediating effect of intention to adopt m-commerce that explains the relationship between attitude toward the behavior, subjective norm, perceived behavioral control and behavioral of adoption to m-commerce.

Hypothesis 5, the result from the Sobel test indicated that there is a positive mediating effect of intention to adopt m-commerce (Sobel t = 2.170, p = 0.030). This result was statistically significant. Thus, hypothesis 5 is statistically supported. In addition, due to the correlation between attitude toward m-commerce and behavior of adoption m-commerce is not statistically significant (r = 0.616, p < 0.001), this means that this relationship is partially mediated by intention to adopt m-commerce.

Hypothesis 6, the result from the Sobel test indicated that there is a positive mediating effect of intention to adopt m-commerce (Sobel t = 2.213, p = 0.027). This result was

statistically significant. Thus, hypothesis 6 is statistically supported. In addition, due to the correlation between subjective norm and behavior of adoption m-commerce is also statistically significant (r = 0.327, p = 0.039), this means this relationship is partially mediated by intention to adopt m-commerce.

Hypothesis 7, the result from the Sobel test indicated that there is a positive mediating effect of intention to adopt m-commerce (Sobel t = 1.127, p = 0.260). This result was not statistically significant. Thus, hypothesis 7 is not supported.

The results of the mediating effect are shown in Table 3 below:

Table 3: Results of mediating effects

Mediating effects	t-statistic
Attitude toward m-commerce → Intention to adopt → Behavioral of adoption	2.170*
Subjective norm → Intention to adopt → Behavioral of adoption	2.213*
Perceived behavioral control → Intention to adopt → Behavioral of adoption	1.127

Note: *= p<0.05, **= p<0.01, ***= p<0.001

To examine a moderating role of educational level to a relationship between an intention to adopt m-commerce and the behavior of adoption m-commerce.

Hypothesis 8 predicted that education level will positively moderate the relationship between intention to adopt m-commerce and behavior of adoption m-commerce. The result indicated that the moderating role of education level is positive and statistically significant (β = 0.333, p = 0.024). This result means that education level strengthens the relationship between intention to adopt m-commerce and behavior of adoption m-commerce. Thus, hypothesis 8 is statistically supported. The result of moderating effect will be presented as data plot in figure 3.

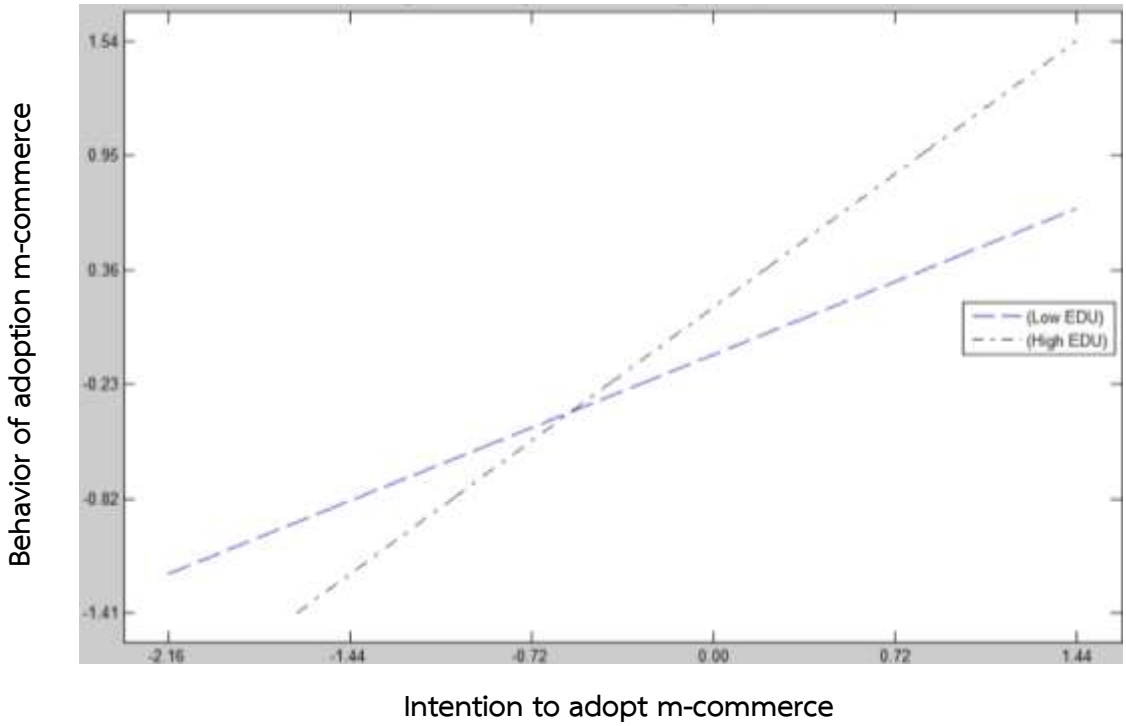


Figure 3: Data plot between intention to adopt m-commerce and behavior of adoption m-commerce.

The figure 3 showed that the stronger of an intention to adopt m-commerce the higher behavior of adoption m-commerce will perform in both group of users: the high education level (a black dot line) and low education level (a blue dot line). Specifically, the graph indicated that mobile users who possess higher education level tend to adopt m-commerce more than who possess lower education level due to the degree of slope of a high education level group is greater than a lower education level group.

Discussion

The results indicated that 7 of 8 hypotheses are statistically supported. According to the TPB model, every relationship in this model is supported except one relationship of the subjective norm to intention to adopt m-commerce is not statistically significant. This result is congruent with the previous study of Khalifa and Shen (2008) who found that perceived behavioral control had an insignificant positive relation to the intention to adopt m-commerce in Hong Kong. This issue could be explained as users already felt familiar with the way of using mobile devices. With this sense of the ease of use, perceived behavior control could not influence them to have an intention to adopt m-commerce.

The mediating effect also examined by the Sobel test to ensure that three independent variables have an effect to behavior of adoption m-commerce through an intention. The result indicated that there are positive significant relationships between attitude toward m-commerce and subjective norm to intention to adopt m-commerce and positive significant relationship between intention to behavior of adoption m-commerce. Moreover, there are also positive significant direct linkages between those independents to the outcome variable. Thus, this means the relationships between attitude toward m-commerce and subjective norm to behavioral of adoption, m-commerce are partially mediated through intention variable.

Besides an original model, the author also examined a positive moderating effect of education level to a relationship between intention to adoption m-commerce and behavior of adoption m-commerce. The result demonstrated that education level was significantly moderated this relationship. This means high educational level users tend to adopt m-commerce more than who possess a lower level of education. This coincided with previous research of adoption of mobile banking in Jordan. The study of Abu-Shanab (2011) investigated that how education level facilitated people to adopt internet banking. The results revealed that higher educational users tend to adopt internet banking more than users who possessed a lower education level. In sum, this study provided empirical evidence to the literature and a theoretical contribution by showing a moderating role of education which never been discovered before.

Conclusion

The objective of this research is to study the adoption of m-commerce in Bangkok, Thailand. Generally, there is a rapid growth of e-commerce and high usage of mobile devices with internet connectivity. However, mobile commerce (m-commerce) is not widely accepted comparing to its percentage to the traditional e-commerce (Hootsuite, 2019). The author used the theory of planned behavior (TPB) to investigate the adoption of m-commerce in Bangkok, Thailand. The partial least squares regression (PLS) was performed. The results showed that all linkage in TPB were significantly supported except one relationship of subjective norm and intention to adopt m-commerce is not statistically significant. Moreover, to understand an insight of how Thai people adopt m-commerce, this study also investigated the moderating role of educational level to the relationship between intention to adopt m-commerce and behavioral of adoption m-commerce. The result

showed that education level moderated this relationship which means higher educational level users tend to adopt m-commerce more than users who have a lower education level.

There are some limitations to this research. First, the data was collected only in Bangkok. Even though, Bangkok has a high percentage of people comparing to the whole nation, Bangkok also has a higher rate of mobile device usage, the data collection in other regions of Thailand is interesting for a better generalizability of the results. Second, the questionnaires used in this research is a self-administered survey which a susceptible to subjective bias from respondents. Third, the cross-sectional data from the survey make the direction of causality difficult to be inferred.

Recommendation

Implementation

For practical implications, first, the managers should develop a user-friendly interface in every type of mobile devices. Not only concerning the ease of use but also a privacy issue which will make people feel secure to make a transaction. This will make users feel favorable to use their company's website or application which in turn make user adopt m-commerce. Second, the marketing scheme for existing or top customers is important. Due to new users tend to rely on Internet influencers that influence them to adopt m-commerce, the company should consider to hire famous bloggers or reviewers to attract a wider range of new users to use m-commerce. Third, the company should focus on customers who have a higher educational level. According to this research's result, higher educational users tend to accept m-commerce more than lower educational level users. This will help the company to raise adoption of m-commerce of target customers.

Future Research

For future research, the author found several areas to investigate. First, in the future, due to a familiarization to mobile device will be expanded to every level of education of people in Thailand. If the adoption of m-commerce is still low, an exploration of other factors (e.g. method of payment, channel of purchasing, cultural dimensions) that may relate to an adoption of m-commerce will be necessary. Second, this kind of research can be conducted in other countries which has never been investigated before. Third, the qualitative method such as interviewing is interesting for finding deeper information such as why a relationship between perceived behavioral control is not influenced an intention to adopt m-commerce in Bangkok, Thailand.

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