Examining the Relationship between Intention to Adopt Mobile Commerce and Behavior of Mobile Commerce Adoption in Consumer Electronic Products
การทดสอบความสัมพันธ์ระหว่างความตั้งใจในการยอมรับการพาณิชย์บนอุปกรณ์เคลื่อนที่และพฤติกรรมการยอมรับการพาณิชย์บนอุปกรณ์เคลื่อนที่ในสินค้าอิเล็กทรอนิกส์

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Abstract

The objective of this research is to investigate the adoption of mobile commerce (m-commerce) in consumer electronic products by using the theory of planned behavior (TPB). The data were obtained by questionnaire surveys from 386 respondents in Bangkok, Thailand. the results from the partial least squares (PLS-SEM) regression analysis demonstrated that attitude toward behavior and the subjective norm was positively related to intention to adopt m-commerce and intention was found to be a mediator between those two antecedents in predicting the behavior of m-commerce adoption.

Keywords: M-commerce, Mobile Commerce, Theory of Planned Behavior, Tpb, Consumer Electronic Product, Electronic Product

บทคัดย่อ

จุดประสงค์ของวิจัยนี้คือ การทดสอบการยอมรับการพาณิชย์บนอุปกรณ์เคลื่อนที่ (เอ็ม-คอมเมิร์ซ) ในการซื้อสินค้าอิเล็กทรอนิกส์เพื่อผู้บริโภคโดยใช้ทฤษฎีพฤติกรรมตามแผน ข้อมูลที่ใช้ในการทดสอบนั้นได้มาจากการเก็บแบบสอบถามจากผู้ตอบแบบสอบถามจำนวน 386 คน ผลการวิจัยโดยวิธีถดถอยกำลังสองน้อยที่สุดบางส่วน (PLS-SEM) พบว่า ทัศนคติต่อพฤติกรรมและการคล้อยตามกลุ่มอ้างอิงนั้นมีผลต่อความตั้งใจใช้ช่องทางการพาณิชย์บนอุปกรณ์เคลื่อนที่และความตั้งใจนั้นยังทำหน้าที่เป็นตัวแปรส่งผ่านไปสู่ยังการตัดสินใจใช้ช่องทางการพาณิชย์บนอุปกรณ์เคลื่อนที่อีกด้วย

คำสำคัญ: เอ็ม-คอมเมิร์ซ การพาณิชย์บนอุปกรณ์เคลื่อนที่ ทฤษฎีพฤติกรรมตามแผน สินค้าอิเล็กทรอนิกส์
สินค้าอิเล็กทรอนิกส์เพื่อผู้บริโภค

Introduction

Thailand was the country that had the most active mobile internet users in Southeast Asia. In 2020, there were approximately 50.01 million active users who mainly access the internet through smartphones and spent approximately 10 hours per day (Statista, 2021). Krairit (2018) illustrated that online shopping was a common behavior that could be found in most internet users. The reasons for this success were the benefits that consumers receive in both monetary and non-monetary aspects (Changchit et al., 2019). For example, they can buy products at a lower price compared with a traditional store, it saves consumers' time than visiting a physical store, and it allows them to compared products easier. This study focused on the area of mobile commerce (m-commerce) which concentrates only on the transactions which have been made through a mobile channel. To date, m-commerce has been penetrated many business sectors such as mobile financial services (m-banking), mobile gaming (m-entertainment), and even mobile medical diagnosis (m-health) (AlSondos & Salameh, 2020). This made this channel not only attractive but may dominate a traditional store.

Despite the growth of online mobile shopping, consumer electronic products were a product category that faced many obstacles since they were introduced online. Generally, consumer electronic products refer to devices that use for communication, entertainment, or information purposes (Liu, 2020). For example, television, smartphone, laptop, and refrigerator. The major problem in purchasing these products is consumers feel uncertain due to the product might be damaged from the delivery, and they are afraid of losing their money from the failure of online payment (Singh & Srivastava, 2020). From these evidence, the author decided to investigate the adoption of m-commerce in consumer electronic products in Thailand which has never been examined before. The theory of planned behavior (TPB) was used in the investigation due to this theory is widely accepted in testing the adoption of m-commerce in various sectors (Cui et al., 2020; Pandey & Chawla, 2020; Singh & Srivastava, 2020).

Moreover, Ali, Thongpapanl, and Ashraf (2020) recently mentioned that the investigation of factors that influences the acceptance of m-commerce in a developing

country is currently scarce. Thus, the results from this research will provide additional empirical evidence to m-commerce and TPB literature, as well as assist managers and executives in better understanding consumer behavior and developing realistic ways to boost their trust in purchasing consumer electronic products online.

Objective

The objective of this study is to investigate the adoption of mobile commerce (m-commerce) in consumer electronic products by using the theory of planned behavior (TPB).

Conceptual Framework
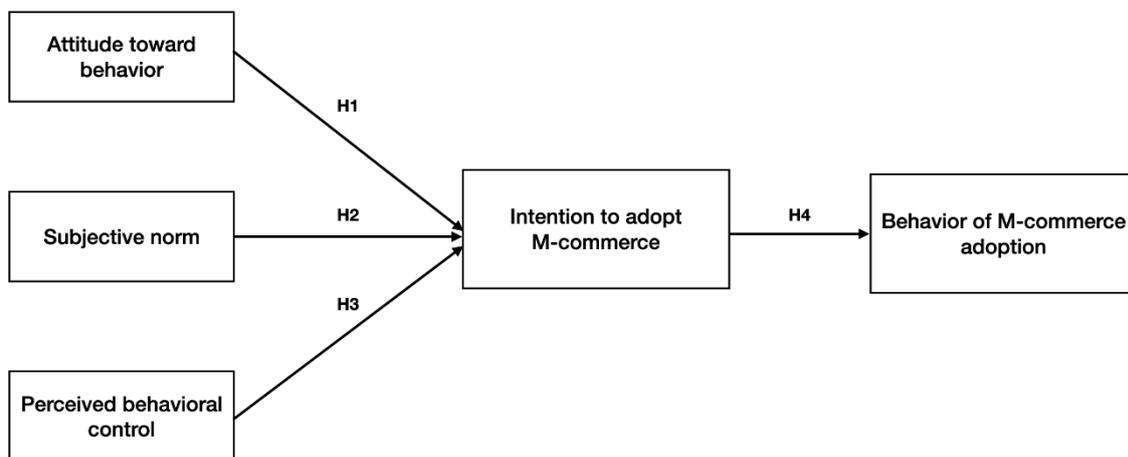
Definition of Research Terms

- **Mobile commerce (m-commerce)** refers to any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobiles access to wireless networks with the help of mobile devices.

- **Consumer electronic products** refer to devices that use for communication, entertainment, or information purposes.

- **Attitude toward behavior** refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question.

- **Subjective norm** refers to the perceived social pressure to perform or not to perform the behavior.

- **Perceived behavioral control** refers to the perceived ease or difficulty of performing the behavior, and it is assumed to reflect experience as well as anticipated impediments and obstacles.

- **Intention to adopt m-commerce** refers to individuals' motivation to use mobile commerce.

- **Behavior of m-commerce adoption** refers to the actual action of persons in using mobile commerce.

Scope of research

1. Scope of population The population of this study was internet users in Bangkok. A total of 386 respondents were surveyed using a convenient sampling method.

2. Scope of content This study focused on the theory of planned behavior (TPB) to examine the adoption of mobile commerce (m-commerce) in consumer electronic products.

3. Scope of time This research had been conducted from August 2020 to May 2021.

Literature review

Mobile commerce (m-commerce)

The term mobile commerce (m-commerce) emerged a moment after smartphones had been invented. In the early stage of m-commerce, it commonly referred to the transactions which had been made by wireless devices or it was just an extension of e-commerce, only the transactions were made online (Ngai & Gunasekaran, 2007). However, Tiwari and Buse (2007) argued that the focus on the monetary transaction through mobile devices is not sufficient to define this term. M-commerce has much more capability compared to e-commerce such as the ability to instantly access products and their information which made customers have an effortless experience in shopping, it has more personalization which is a capability to filter information that suits one's preferences, and the ability to broadcast information to a large population at once (Siau et al, 2001). Therefore, many business industries have discovered this channel to be a beneficial place to conduct business. (Frolick & Chen, 2004).

Tiwari and Buse (2007) defined m-commerce as "any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobile access to wireless networks with the help of mobile devices".

At present, m-commerce does not restrict only to smartphones due to the development of technology that allows persons to access the internet through various types of mobile (Liang & Wei, 2004). This indicates that m-commerce has penetrated our lives through a variety of channels, and it offers numerous advantages to both individuals and enterprises. For individuals, they can purchase the product at a lower price compared to the traditional store, they can easily compare products from the various stores at the same time, and they can save time in shopping (Changchit et al., 2019). For companies, Firms can decrease operational costs, improve customers' satisfaction, and increase overall productivity (Chau et al., 2021).

Theory of Planned Behavior (TPB) in mobile commerce (m-commerce) context

The theory of planned behavior (TPB) was developed by Ajzen (1991). It explains how individuals perform a particular action (Ajzen, 1991). The main idea of the model is the intention of individuals that influence them to take actual actions was predicted by three variables which are attitude toward behavior, subjective norm, and perceived behavioral control. First, attitude toward behavior referred to "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188). This means when persons feel favorable in particular actions. They will have an intention to perform. Otherwise, if they feel unfavorable to those particular actions, they will neglect those behaviors. Second, the subjective norm was defined as "the perceived social pressure to perform or not to perform the behavior" Ajzen (1991, p. 188). This means social interactions have the power to influence individuals to enact a particular action. A positive social influence may induce persons to have an intention to perform. In contrast, a negative social interaction may reduce an individual's intention on that behavior. Third, perceived behavioral control refers to "the perceived ease or difficulty of performing the behavior, and it is assumed to reflect experience as well as anticipated impediments and obstacles" (Ajzen, 1991, p. 188). The difficulty appears to be the main factor that involves individuals' intentions. If they appraise that there are obstacles in performing the behaviors, they may have less intention to do. However, if they assess that it is simple to exhibit the actions, they are inclined to perform those actions.

In the m-commerce literature, a previous meta-analysis study of Chhonker et al. (2018) indicated that that TPB was one of the significant theories that scholars used to

investigate m-commerce in the past decade. For instance, the recent study of Troise et al. (2021) used TPB to investigate the adoption of using food delivery applications during the COVID-19 pandemic. The findings demonstrated that attitude toward behavior, subjective norm, and perceived behavioral control affected behavioral intention. Moreover, the research of Suthatorn (2019) examined people's adoption in purchasing retail products through mobile devices. The results showed that attitude toward behavior and subjective norm influenced people's intention in adopting m-commerce for purchasing retail products. From these evidence, the author purposed that attitude toward behavior, subjective norm, and perceived behavioral control will positively relate to intention to adopt m-commerce, and intention will positively relate to behavior of m-commerce adoption. Thus, hypotheses 1 to 4 are proposed as followed.

Hypothesis 1: Attitude toward behavior will positively relate to intention to adopt m-commerce

Hypothesis 2: Subjective norm will positively relate to intention to adopt m-commerce

Hypothesis 3: Perceived behavioral control will positively relate to intention to adopt m-commerce

Hypothesis 4: The intention to adopt M-commerce will positively relate to behavior of m-commerce adoption

Research Methodology

Population and samples

The research focused on consumers who possessed a mobile device with internet access in Bangkok. This study used convenience sampling which is a non-probability sampling method for the data collection. Due to the city was facing a COVID-19 pandemic at the time of the collection period, the author decided to used internet surveys instead of a traditional face-to-face method to collect the data for avoiding a virus infection. The sampling frame of this study was the internet users on the author's social media platforms. A total of 523 internet users were selected as samples of this study. The self-administered questionnaires were used to acquire data for the analysis. The online questionnaire surveys were sent to the participants through three social media platforms: Facebook Messenger, Line, and Instagram. More importantly, the author conducted the data collection according to the rules

and ethics of the college's committee. The data collection was performed by concerning respondents' voluntary, and confidentiality basis. On top of the online questionnaires, the participants were indicated about these issues and the data can be accessed only by the author for the research purpose.

Measures

The measurement of acceptance in purchasing consumer electronic products through m-commerce, the author adopted the scales from the theory of planned behavior (TPB) of Ajzen (1991). The scales include five variables which are attitude toward behavior (5 items), subjective norm (5 items), perceived behavioral control (5 items), intention (5 items), and behavior (3 items). All items were measured using 5-pointed Likert scales (1=strongly disagree to 5=strongly agree).

The original scales were developed in English. However, the respondents of this study are Thai. The author has to translate all questions in the questionnaire into English. To confirm its validity and reliability, the questionnaire was translated into Thai and back-translated to English by a native English speaker who is also an expert in Thai (Brislin, 1970). Moreover, the control variables were included in this study which included gender, age, educational level, and online shopping frequency.

Data Analysis

This research used the partial least squares (PLS) regression to examine the data. There were several benefits of PLS that make this technique matched our study. For instance, PLS allows non-normal distribution data to be analyzed, PLS can examine a small sample size of data better than other SEM techniques, PLS encompasses various statistical tools such as path analysis, structural equation modeling, simple and multiple regression. In addition, the author also performed a validity and reliability test before a PLS-SEM examination. For the validity test, the author used convergent validity and discriminant validity to confirm that the data measure what they intended to measure. This study used factor loadings and cross-loadings for assessing convergent validity. For discriminant validity, the author used average variance extraction (AVE) together with the Heterotrait-Monotriait (HTMT) ratio to confirm that variables are distinguished from the others. In particular, HTMT was defined as "the mean value of the indicator correlations across constructs relative to the mean of the average

correlations of the indicators measuring the same construct" (Ringle et al, 2020). This criterion was recently recommended due to its robustness in examining discriminant validity between constructs (Henseler et al., 2015; Ringle et al., 2020). Then, the reliability test was performed by using Cronbach's alpha and composite reliability to ensure the scales' always yield the same results. The data were analyzed through the WarpPLS program.

Results

After the data collection period, the respondents returned 386 completed surveys which accounted for a 73.8 percent response rate. Before conducting the analysis, the validity test and reliability test were performed to ensure the quality of data. For validity tests, two types of validity tests were conducted which were convergent and discriminant validity tests.

For convergent validity, the author examined factor loadings and cross-loadings to measure indicators of this study. The acceptable value for each indicator is above 0.5. The results indicated that all item has a value above 0.5 except the items from subjective norm and perceived behavioral control that the value was below the requirement. Thus, these two items were removed from the analysis. Therefore, the convergent validity of this research is acceptable.

For discriminant validity, this research used two types of discriminant validity tests which were average variance extraction (AVE) and the heterotrait-Monotrait (HTMT) ratio. First, the average variance extraction (AVE) was measured by comparing the square root of the average variance extracted with its correlation to other constructs. Fornell and Larker (1981) indicated that if the value is higher than the correlation to other variables, the discriminant validity is acceptable. The results showed that the average variance extraction (AVE) of every variable is higher than its correlation they were involved. This means the discriminant validity of this model is acceptable. Next, the heterotrait-monotrait (HTMT) ratio was tested. If the construct has a value above 0.85, this means it is distinguished from the others. The results indicated that all the variable has a value below 0.85 which means that all variable in the conceptual model is distinct. Therefore, the heterotrait-monotrait (HTMT) ratio is acceptable. Therefore, the discriminant validity is not a serious concern for this research. Thus, the validity of this study is acceptable. The results of that the average variance extraction (AVE) and the heterotrait-monotrait (HTMT) ratio were shown in table 1 and 2.

Table 1: Correlations and the average of variance extracted (AVEs)

	ATT	NORM	CTRL	INTEN	BEHAV	GEN	AGE	EDU	SAL	SHOP
ATT	(0.744)									
NORM	0.146	(0.803)								
CTRL	0.352**	0.005	(0.756)							
INTEN	0.727***	0.445***	0.185	(0.825)						
BEHAV	0.600***	0.326*	-0.048	0.725***	(0.859)					
GEN	-0.085	0.189	0.132	0.094	0.146	(1.000)				
AGE	-0.026	-0.039	-0.150	0.098	0.054	0.300*	(1.000)			
EDU	-0.216	-0.121	-0.166	-0.117	0.008	0.243	0.513***	(1.000)		
SAL	0.046	0.072	0.029	0.154	0.280*	0.421***	0.370**	0.459***	(1.000)	
SHOP	0.244	0.039	-0.300*	0.144	0.407*	0.005	0.132	0.077	0.154	(1.000)

Note: ATT = Attitude toward the behavior, NORM = Subjective norm, BCTRL = Perceived behavioral control, INTEN = Intention, BHAV = Behavioral, GEN = Gender, EDU = Educational level, SAL = Salary, SHOP = Online shopping frequency (per month), * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001, The square root of AVE displays in the parentheses.

Table 2: Heterotrait-monotrait (HTMT) ratio of correlations

	ATT	NORM	CTRL	INTEN	BEHAV
ATT					
NORM	0.285				
CTRL	0.516	0.305			
INTEN	0.877	0.533	0.333		
BEHAV	0.735	0.416	0.299	0.845	

Note: ATT = Attitude toward the behavior, NORM = Subjective norm, BCTRL = Perceived behavioral control, INTEN = Intention, BHAV = Behavioral

The reliability test was performed by using Cronbach's alpha and a composite reliability test. The minimum requirement for each criterion is 0.8 (Nunnally, 1978). The results indicated that all variables have values above the threshold. Thus, the data of this study is reliable. The findings of reliability were presented in table 3.

Table 3: Reliability tests' results

	ATT	NORM	CTRL	INTEN	BEHAV
Cronbach's alpha	0.859	0.878	0.839	0.913	0.892
Composite	0.803	0.814	0.802	0.880	0.811

Note: ATT = Attitude toward the behavior, NORM = Subjective norm, BCTRL = Perceived behavioral control, INTEN = Intention, BHAV = Behavioral

Moreover, multicollinearity was analyzed to check whether the two or more constructs in the model are highly correlated (Farrar & Glauber, 1967). To examine multicollinearity in the model, the variance inflation factor (VIF) is the criterion that uses to investigate this issue. The author used a full VIF because it encompasses both lateral and vertical multicollinearity assessment. Kock and Lynn (2012a) suggested that to alleviate multicollinearity, the value of the full VIF should not exceed 3.3. the results showed that the full VIFs of this study were less than 3.3. This means there is no multicollinearity in this research.

Lastly, the normality of the data was examined. This test allowed the author to investigate a normal distribution of the data by using Jarque-Bera and Robust Jarque-Bera test of normality. The result showed that half of the variable's data were not followed the normal distribution. However, this makes PLS-SEM was an appropriate research tool for this study because the previous research indicated that PLS-SEM provided a robust analysis when using data that do not follow the normal distribution (Hair et al., 2012).

Hypotheses Testing

This research purposed four hypotheses according to the theory of planned behavior (TPB). The findings from PLS-SEM indicated that three of four hypotheses are statistically significant. The results were indicated in figure 1.
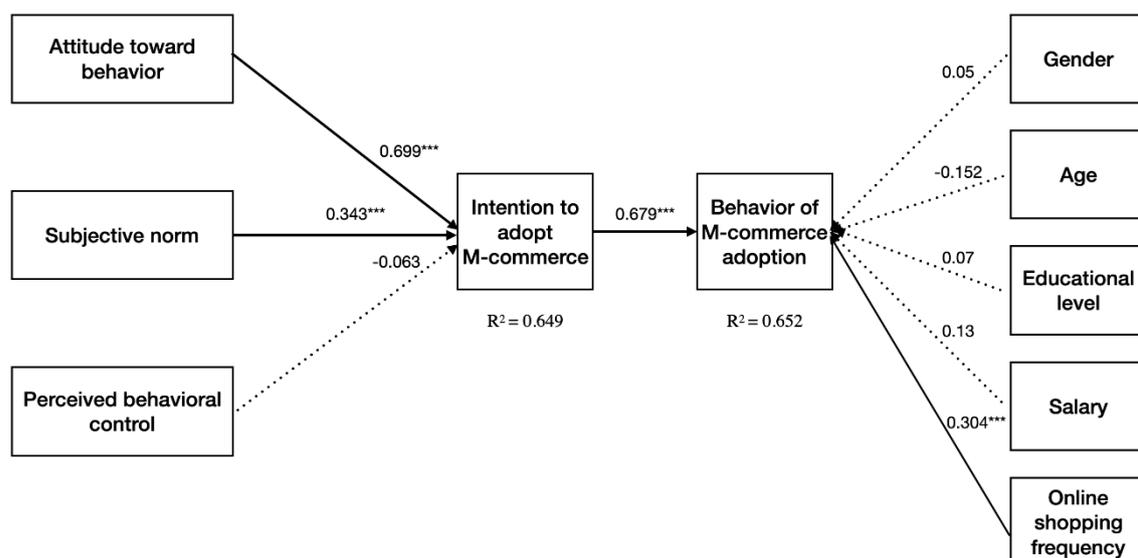

Figure 1: Model results

Hypothesis 1: Attitude toward behavior will positively relate to intention to adopt m-commerce

The findings indicated that attitude toward behavior was positively related to an intention. This means individuals who have a high level of attitude toward behavior will have a high level of intention. This relationship was statistically significant (β = 0.699, p < 0.001). Thus, hypothesis 1 was supported.

Hypothesis 2: Subjective norm will positively relate to intention to adopt m-commerce

The results showed that subjective norm was positively related to an intention. This means individuals who have a high level of the subjective norm will have a high level of intention. This relationship was statistically significant (β = 0.343, p < 0.001). Thus, hypothesis 2 was supported.

Hypothesis 3: Perceived behavioral control will positively relate to intention to adopt m-commerce

The results indicated that the perceived behavioral control was negatively related to the intention. This means individuals who have a high level of perceived behavioral control will have a low level of intention. This relationship was not statistically significant (β = -0.063, p = 0.275). Thus, hypothesis 3 was not supported.

Moreover, the r-squared of the above relationships was 0.649. This means this variable block was explained by 64.9 percent.

Hypothesis 4: The intention to adopt m-commerce will positively relate to behavior of m-commerce adoption

The findings showed that intention was positively related to the behavior. This means individuals who have a high level of intention will have a high level of behavior. This relationship was statistically significant (β = 0.679, p < 0.001). Thus, hypothesis 4 was supported.

Moreover, the r-squared of this relationship was 0.652. This means this variable block was explained by 65.2 percent.

Gender was positively related to behavior (β = 0.054, p = 0.248), age was negatively related to behavior (β = -0.152, p = 0.248), educational level was positively related to behavior (β = 0.070, p = 0.240), salary was positively related to behavior (β = 0.130, p =

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0.086). However, all of these control variables' findings were not statistically significant excepted one control variable, online shopping frequency was positively related to behavior (β = 0.304, p < 0.001) and the result were statistically significant.

Mediating roles of intention

In addition, this study also investigated the mediating effect of intention by using the Sobel test (Preacher & Leonardelli, 2001). The findings showed that both attitude toward behavior (Sobel t = 4.872, p < 0.001), and subjective norm (Sobel t = 3.202, p = 0.001) were statistically related to behavior through intention to adopt m-commerce. Thus, the Sobel test confirmed the mediating role of intention in this model.

Discussion

There are three of four hypotheses that are statistically supported. The findings illustrated that attitude toward behavior and subjective norms positively related to the intention to adopt m-commerce and the intention positively related to the behavior of m-commerce adoption. This means the favorable attitude in using mobile devices to purchase consumer electronic products lead people to have an intention which in turn influences them to make an actual transaction. Moreover, social supports is also important. The support from social leads individuals to develop better intentions on purchasing consumer electronic products through mobile devices. This finding coincides with the study of Wan et al. (2017) who demonstrate that attitude towards behavior and subjective norms play an important role in predicting the recycling intention of people in Hong Kong. Additionally, Piazza et al. (2019) also found that attitude towards behavior and subjective norm were the main predictor in predicting an intention to use a mobile application while crossing the street. Furthermore, this study also found that online shopping frequency was positively related to behavior. This is congruent with the previous research of Yang et al. (2018) who found that the group of respondents that have a high online shopping frequency will have a higher purchase intention. Conclusively, the results from this study contributed empirical evidence to m-commerce literature by investigating consumer's purchasing behavior in electronic products which never been discovered before.

Conclusion

The objective of this study was to investigate the adoption of mobile commerce (m-commerce) in consumer electronic products by using the theory of planned behavior (TPB). The results from PLS-SEM revealed that attitude towards behavior and subjective norms were positively related to intention to adopt m-commerce. Particularly, the intention played an important role as a mediator between those variables and behavior. These findings also contribute to the theory of planned behavior as empirical evidence in the adoption of mobile commerce in purchasing consumer electronic products. There are some limitations to this research. First, the self-administrated questionnaire may cause a subjective bias. Second, the data were collected in a single period which accounted as cross-sectional data. Thus, the results cannot be explained as causality, but have to be interpreted as the relationship. Third, the nonprobability sampling may not represent an entire population.

Recommendations

The results suggested consumer electronic product companies focus on three aspects which are attitude toward behavior, subjective norm, and the online shopping frequency. First, to build a positive attitude with users, the companies should make the user interface (UI) of the application or website interact friendly with customers. This will enhance customers' satisfaction by giving a better user experience (UX). Second, the consumer electronic products company should focus on establishing the relationship with existing customers who already purchase the products through a mobile commerce channel due to there is a possibility that they can affect the potential customers and turn them into new customers. Furthermore, the company may initiate a referral program for existing customers to motivate them to lead potential prospects to the mobile commerce channel. Moreover, the online community of the products might be a significant tool to spread confidence in purchasing products online to a larger scale of the population. Third, the frequent buyers of other product categories are potential customers for the consumer electronic products companies. Due to frequent buyers already possessed experiences in online shopping, they may be less concerned if they encounter any difficulties during the purchasing procedure. The companies may consider the frequent buyers from related-product categories such as

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retail products. This will make the consumer electronic product companies penetrated a new group of customers.

Future research

This research contributes a theoretical contribution and empirical evidence to the literature. However, there are some areas that the author did not investigate in this study. First, most respondents lived in Bangkok. the results may represent people in the metropolitan area. The suburban area is an interesting sample that needs to be explored due to the growth of the internet in a major city. Second, the other products which have a high sale volume in the traditional store but have not yet become popular in the mobile channel are the interesting categories that need to be investigated (e.g. automobile and real estate) Lastly, various factors such as salary, age, or stress could moderate or mediate the relationship within the model. This will provide a more understanding of the mobile purchasing adoption of customers.

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